

Annotated type catalogue of lymnaeid snails (Mollusca, Gastropoda) in the collection of the Natural History Museum, Berlin

Maxim V. Vinarski^{1,2}

1 *Laboratory of Macroecology and Biogeography of Invertebrates, Saint-Petersburg State University, 7-9 Universitetskaya Emb., Saint-Petersburg, Russian Federation, 199034*

2 *Museum of Siberian Aquatic Molluscs, Omsk State Pedagogical University, 14 Tukhachevskogo Emb., Omsk, Russian Federation, 644099*

<http://zoobank.org/2589CECE-F1F5-4D0F-AC4E-F032A70FB03F>

Corresponding author: Maxim V. Vinarski (radix.vinarski@gmail.com)

Abstract

Received 11 February 2016

Accepted 18 May 2016

Published 27 May 2016

Academic editor:

Matthias Glaubrecht

The article deals with examination of the type materials of sixty-one species and variety of lymnaeid snails (Mollusca: Gastropoda: Lymnaeidae) housed in molluscan collection of the Natural History Museum Berlin, Germany (ZMB). Each taxon is discussed following the same scheme, including synonymy, information on the type materials, current taxonomic allocation, taxonomic and nomenclatorial remarks.

Key Words

Pond snails

taxonomy

nomenclature

type series

history of malacology

Introduction

The malacological collection of the Berlin Natural History Museum, Germany (ZMB hereafter) is among the richest molluscan repositories of the World. A brief information on the origin of the collection and its founders and former curators may be found in Glaubrecht and Zorn (2012) that allows me to omit it here. From the nomenclatorial point of view, the most valuable part of ZMB collection is that including the type materials of species described either by ZMB employes and associates (von Martens, Simroth, Thiele) or by scientists from other scientific institutions and / or countries. The systematic description of the type collection and publication of annotated catalogues of the type materials of molluscan species has started in 1960s (Kiliyas 1961, 1967) and is continuing now. In total, more than ten papers devoted to examination of the ZMB type materials have appeared in the last two decades. Most of

them deal with terrestrial snails and slugs of various families (Köhler 2007; Glaubrecht and Zorn 2012; Breure 2013), others are devoted to cephalopods (Glaubrecht and Salcedo-Vargas 2000), freshwater snails (Köhler and Glaubrecht 2006), and brakishwater bivalves (Glaubrecht et al. 2007).

In this article, I present the results of my examination of the type series of species belonging to the family Lymnaeidae Rafinesque, 1815 housed in ZMB. This diverse family of aquatic pulmonates includes, according to different authorities, from 40 (Hubendick 1951) to several hundreds (Kruglov 2005) living species, most of which are characterized by substantial variation in shell traits. High phenotypical plasticity demonstrated by lymnaeids is the main cause that systematics of this family has been overloaded by synonyms. Hubendick (1951) listed more than 1000 names of the species group introduced by malacologists in their attempts to arrange the

lymnaeid diversity, and it is by no means the exhaustive list. Though the vast majority of these names have been thrown out to the limbo of synonyms, many of them are still available for nomenclatorial acts. A relatively recent example of the resurrection of a long-forgotten lymnaeid name is Falkner et al. (2002) proposition to replace the species name *Radix peregra* (O.F. Müller, 1774) with almost ignored one, *R. labiatus* (Rossmässler, 1835), which was not in use since the middle of the 19th century. The current advances in molecular taxonomic studies also may create a situation when a long neglected name should be resurrected out of the limbo as being the oldest available label for a designation of a certain cryptic species not recognized by earlier, morphology-based, taxonomy. It makes both examination of the type specimens and publication of their images a challenging business, rather than a sort of activity once thought to be the destiny of old-fashioned museum curators and amateur conchologists.

Material and methods

This study is a part of my recent project devoted to identification and publication of the Lymnaeidae types from European repositories. I worked with ZMB collection in April of 2015 searching for type materials of lymnaeid species described by Franz Hermann Troschel, Wilhelm Dunker, Eduard von Martens, Frank C. Baker and other, less prominent, malacologists of the 19th – first half of the 20th century. Some of these type series were identified earlier by Kiliass (1961, 1967), who listed them and published illustrations of type specimens of a few of these species. However, the closer examination has shown Kiliass overlooked nearly 30 type series kept in ZMB. In two his papers, the type materials of 31 lymnaeid taxa of species and below species rank were characterized, whereas in 2015 I managed to identify and examine as many as sixty one type series represented by dried shells exclusively. All these sixty one type series are presented below with images of syntypes (or lectotypes), shell dimensions, brief synonymies and various remarks concerning taxonomy, nomenclature and distribution of the taxa. The taxa accounts are arranged in the alphabetic order. The generic and suprageneric taxonomy used here follows my previously published system (Vinarski 2013). The structure of the article as well as the taxa accounts is based on the recently published catalogues of ZMB collection. As the nearest example to mimic I chose Köhler's (2007) article. The scheme of measurements of a turbospiral shell corresponds to shemes used in recent taxonomic monographs (Glöer 2002; Kruglov 2005).

Abbreviations of shell dimensions are as follows. SH – shell height, SW – shell width, SpH – spire height, BWH – body whorl height, AH – aperture height, AW – aperture width, WN – whorls number. All dimensions in the taxa accounts are given in millimeters.

Abbreviations of the malacological repositories

BMNH – British Museum (Natural History), London, UK; MNHN – National Museum of Natural History, Paris, France; NHMV – Natural History Museum in Vienna, Austria; NMG – Natural History Museum in Gothenburg, Sweden; ZIN – Zoological Institute, the Russian Academy of Sciences, Saint-Petersburg, Russia; ZMB – Berlin Natural History Museum, Germany.

Systematic list of species and varieties arranged in alphabetical order

alfredi Suter, 1890

Fig. 1

Limnaea alfredi Suter 1890: 229, pl. 15, figs. 17, 17a.

Limnaea tenisoni var. β *Alfredi* Suter 1893: 230.

Lymnoëa alfredi Suter 1913: 604, pl. 24, fig. 10.

Limnaea alfredi Dell 1956: 74, figs. 8, 9, 11, 12.

Limnaea alfredi Kiliass 1967: 337.

Lymnaea truncatula Climo and Pullan 1972: 6, figs. 2C–E, 3D.

Type material. The lectotype is housed in the Museum of New Zealand (Te Papa Tongarewa) under accession number M 125077 (see Dell 1956, fig. 8; Climo and Pullan 1972, fig. 2 E). ZMB collection possesses two paralectotypes kept under accession number 47038. The largest of the two is 7,2 mm height.

Type locality. New Zealand, Southern Island, Governors Bush, Hooker Valley, Mount Cook Hermitage (fide Kiliass 1967). leg. H. Suter.

Current taxonomic allocation. Climo and Pullan (1972) considered it to be a synonym of *Galba (Galba) truncatula* (O.F. Müller, 1774) introduced to New Zealand after advent of Europeans, however Dell (1956: 74) noted some slight conchological differences between *L. alfredi* and *G. truncatula* and stated that *L. alfredi* “has had a history in New Zealand that pre-dates European influence” and that “it is a truly indigenous form”. Hubendick (1951) synonymized *L. alfredi* with *Limnaea tenella* Hutton, 1885, but Dell (1956) was able to show that the latter species name was based on juvenile shells of the introduced from Europe *Lymnaea stagnalis* (L., 1758).

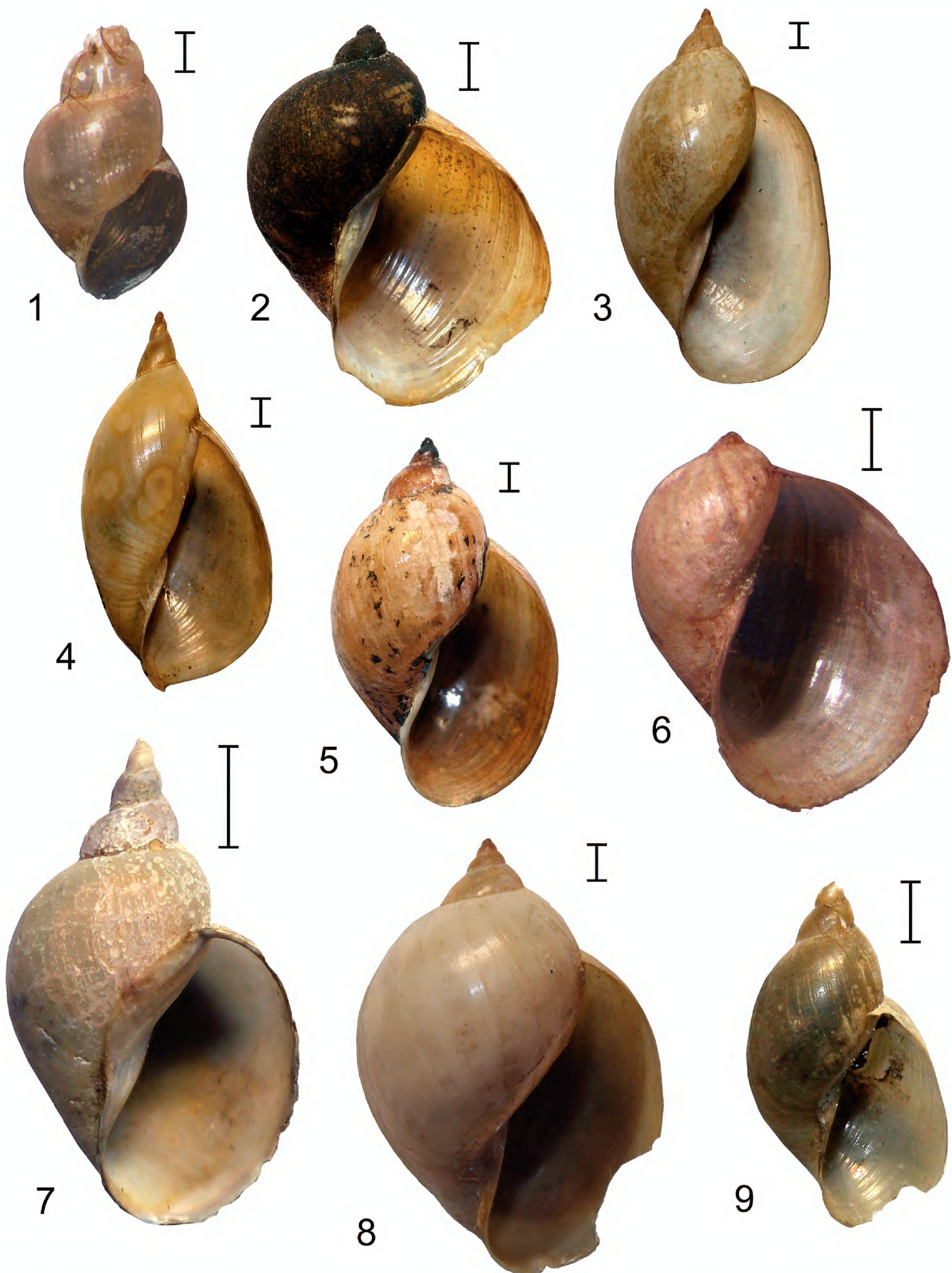
amnicola Westerlund, 1890

Fig. 2

Limnaea (Gulnaria) ovata var. *amnicola* Westerlund 1890: 147.

Limnaea ovata var. *amnicola* Kiliass 1967: 337.

Type material. It is known that Westerlund often distributed parts of the type series of taxa described by him among several European museums (Vinarski et al. 2013), therefore in many cases the syntypes of the same species or variety are kept now in more than one repository. I



Figures 1–9. Type specimens of Lymnaeidae (ZMB). **1** – *Limnaea alfredi* Suter, 1890, a paralectotype. **2** – *Limnaea ovata* var. *amnicola* Westerlund, 1890, a syntype. **3, 4** – *Limnaeus amygdalum* Troschel, 1837, two syntypes. **5** – *Limnaea javanica* var. *angustior* von Martens, 1881, a syntype. **6** – *Limnaea brevispira* von Martens, 1897, the holotype. **7** – *Limnaea stagnalis* var. *baltica* Lindström, 1869, a syntype. **8** – *Limnaeus cerasum* Troschel, 1837, a syntype. **9** – *Limnaea columella* var. *championi* von Martens, 1899, a syntype. Scale bars: 1 mm (**1**), 2 mm (**2–6, 8–9**), 5 mm (**7**).

managed to find syntypes of *L. ovata* var. *amnicola* in NMG (accession number 3727), ZIN (accession number 1) and ZMB (three syntypes kept under No. 49530). The lectotype was not designated.

Type locality. Ronneby and Kristianstad, Sweden (Westerlund 1890).

Current taxonomic allocation. An obvious junior synonym of *Radix* (*Peregriana*) *balthica* (L., 1758).

amygdalum Troschel, 1837

Figs 3, 4

Limnaeus amygdalum Troschel 1837: 168.

Limnaeus amygdalum Küster 1862: 35, pl. 6, figs 15, 16.

Limnaea acuminata var. *amygdalum* von Martens, 1881: 76, pl. 14, figs 7, 8.

Limnaea acuminata var. *amygdalum* Preston 1915: 107.

Limnaea acuminata f. *typica* Annandale and Rao 1925: 180.

Lymnaea auricularia race *rufescens* Hubendick 1951: 157, fig. 344.

Lymnaea (*Pseudosuccinea*) *acuminata* Subba Rao 1989: 126, figs 254–265, 272.

Type material. Two samples of *L. amygdalum* from the Ganges River in ZMB (Nos. 72991 and 109767) contain, in total, 12 syntypes. The largest syntype is 30.0 mm height. The syntypes are visibly different in their proportions (compare figs 3 and 4).

Type locality. India, the Ganges River.

Current taxonomic allocation. *Radix* (*Radix*) *rufescens* (Gray, 1822).

angustior von Martens, 1881

Fig. 5

Limnaea javanica var. *angustior* von Martens, 1881: 88, pl. 16, fig. 8.

Limnaea javanica var. *angustior* von Martens, 1897a: 4.

Limnaea javanica var. *angustior* Kilius, 1961: 162.

Type material. 49 syntypes collected in Makassar (Celebes Island, Indonesia) and kept under No. 8136. The largest of these shells reaches 26.2 mm height. Kilius (1961) reported that he intended one of these shells to become the lectotype of *Limnaea javanica* var. *angustior* and separated it under accession number 8136a, however I was not able to find this specimen in ZMB collection. Probably, it is still placed among other syntypes under No. 8136.

Type locality. Indonesia: Java Island (Batavia and Tjissurupan), Celebes Island (Makassar). leg. von Martens.

Current taxonomic allocation. *Cerasina luteola* (Lamarck, 1822). Hubendick (1951) synonymized *L. javanica* var. *angustior* with the race *rubiginosa* of *Radix auricularia* (L., 1758).

baltica Lindström, 1868

Fig. 7

Limnaea stagnalis var. *baltica* Lindström 1868: 22.

Limnaea stagnalis var. *baltica* Westerlund 1885: 29.

Limnaea stagnalis f. *baltica* Kilius 1961: 162.

Type material. ZMB collection contains six specimens (presumably syntypes) of this variety from Westerlund's collection. The largest of them is 24.2 mm height (Lindström [1868] reported the maximum shell height for this variety equal to 30 mm). The current location of other shells from the type series is unknown.

Type locality. Baltic Sea, east shores of the Gotland Island (Östergarn, Legraf, Haugröne and Fårosund).

Current taxonomic allocation. *Lymnaea* (*Lymnaea*) *stagnalis*. This variety represents a dwarf morph of the great pond snail inhabiting the Baltic Sea (Westerlund 1885).

brevispira von Martens, 1897

Fig. 6

Limnaea brevispira von Martens 1897a: 2, pl. 1, figs 1, 2; pl. 13, figs 1, 3.

Lymnaea brevispira Hubendick 1951: 165, fig. 356.

Lymnaea brevispira Kilius 1961: 163.

Type material. A single specimen is kept in ZMB under accession number 101157. The original description of the species was based on this single specimen (von Martens 1897a) and thus this specimen must be regarded as the holotype by monotypy.

Holotype dimensions. WN 2.50; SH 10.9; SW 9.5; SpH 1.2; BWH 10.4; AH 9.6; SW 6.8.

Type locality. Indonesia, Sumatra Island, Manindjau Lake.

Current taxonomic allocation. This is valid species with unclear generic position. It may belong to either genus *Austropeplea* Cotton, 1942 or to the genus *Bullastra* Bergh, 1901.

cerasum Troschel, 1837

Fig. 8

Limnaeus cerasum Troschel 1837: 170.

Limnaea acuminata var. *cerasum* Preston 1915: 108.

Lymnaea luteola Hubendick 1951: 161, fig. 349.

Type material. There are three samples of *L. cerasum* from the Ganges River in ZMB kept under accession numbers 8650 (six syntypes), 72989 (a single syntype), and 109766 (two syntypes). The largest syntype's shell is 23.3 mm height.

Type locality. India, the Ganges River.

Current taxonomic allocation. A junior synonym of *Cerasina luteola*.

championi von Martens, 1899

Fig. 9

Limnaea columella var. *championi* von Martens 1890-1901: 378, pl. XIX, fig. 12.

Limnaea columella var. *championi* Kiliyas 1961: 162.

Type material. Two syntypes collected in Bugaba (South Panama) by Champion and kept in ZMB collection under No. 51244. The largest of these shells reaches 12.4 mm height. Kiliyas (1961) reported that he intended one of these shells to become the lectotype of *Limnaea columella* var. *championi* and separated it under accession number 51244a, however I was not able to find this specimen in ZMB collection. Probably, it is still placed among other syntypes under No. 51244. Both type specimens represent subadult shells.

Type locality. Panama (southern), Bugaba.

Current taxonomic allocation. *Pseudosuccinea columella* (Say, 1817).

coreana von Martens, 1886

Fig. 10

Limnaea auricularia var. *coreana* von Martens 1886: 80.

Lymnaea auricularia var. *coreana* Kiliyas 1967: 338, fig. 2.

Lymnaea (Radix) coreana Bogatov and Zatravkin 1990: 112, fig. 28 B.

Lymnaea (Radix) coreana Kruglov and Starobogatov 1993a: 92, fig. 14 C.

Lymnaea (Radix) coreana Starobogatov et al. 2004: 316, pl. 132, fig. 2.

Type material. 11 syntypes in two samples: No. 38440 (seven syntypes) and No. 55594 (4 syntypes), leg. Gottsche (without date).

Type locality. Korea, “Changjin, Prov. Hangyöngdo”.

Current taxonomic allocation. *Radix (Radix) coreana*.

Syntypes dimensions. See Table 1.

Remarks. Hubendick (1951) considered *L. auricularia* var. *coreana* as a synonym of *R. auricularia*, whereas the Russian authors (Bogatov and Zatravkin 1990; Kruglov and Starobogatov 1993; Kantor et al. 2010) accept its validity. Kiliyas (1967) stated he separated one of the syntypes under the museum number 38440a – to become the lectotype of this taxon. However, I failed to find this specimen in the collection. Currently none of the syntypes either is labelled as the syntype or is placed in a separate container with number 38440a.

costulata von Martens, 1874

Fig. 11

Limnaea lagotis var. *costulata* von Martens 1874: 26, pl. II, fig. 24.

Limnaea lagotis var. *costulata* Nevill 1878: 8.

Limnaea lagotis f. *costulata* Annandale & Rao 1925: 153, fig. 7.

Limnaea auricularia var. *lagotis* f. *costulata* Zhadin 1933: 95.

Lymnaea costulata Hubendick 1951: 72, fig. 154.

Radix lagotis var. *costulata* Zhadin 1952: 170, fig. 67.

Type material. I could not recognize the syntype(s) of this variety in ZMB collection. However, there are several specimens (subadult shells) labelled as *L. lagotis* var. *costulata* and collected in Charik-Kul’ Lake (Uzbekistan, in vicinities of Katta-Kurgan Town) by Fedchenko (see Fig. 11). Martens (1874: 27) discussed shells from this locality in his monograph under the name *L. lagotis* but did not assign them to a certain variety of this species. It is unclear who and when identified shells from Charik-Kul’ as *L. lagotis* var. *costulata*.

Type locality. Uzbekistan, Tashkent City, leg. A.P. Fedchenko.

Current taxonomic allocation. *Radix (Peregriana) lagotis* (Schränk, 1803) or *Radix (Radix)* sp.

Remark. In 1897, von Martens (1897a) described a new variety *Limnaea javanica* var. *costulata* from Indonesia (Java Island). I was not able to find the type series of it in ZMB collection.

cubensis Pfeiffer, 1839

Fig. 12

Limnaeus cubensis Pfeiffer 1839: 354.

Limnaeus cubensis Küster 1862: 32, pl. 6, figs 6–8.

Limnaea cubensis von Martens 1899: 378.

Galba (Galba) cubensis Baker 1911: 204, pl. 27, figs 9–16.

Lymnaea cubensis Hubendick 1951: 128, fig. 310.

Limnaeus cubensis Kiliyas 1961: 163.

Fossaria (Bakerilymnaea) cubensis Burch 1989: 174, fig. 587.

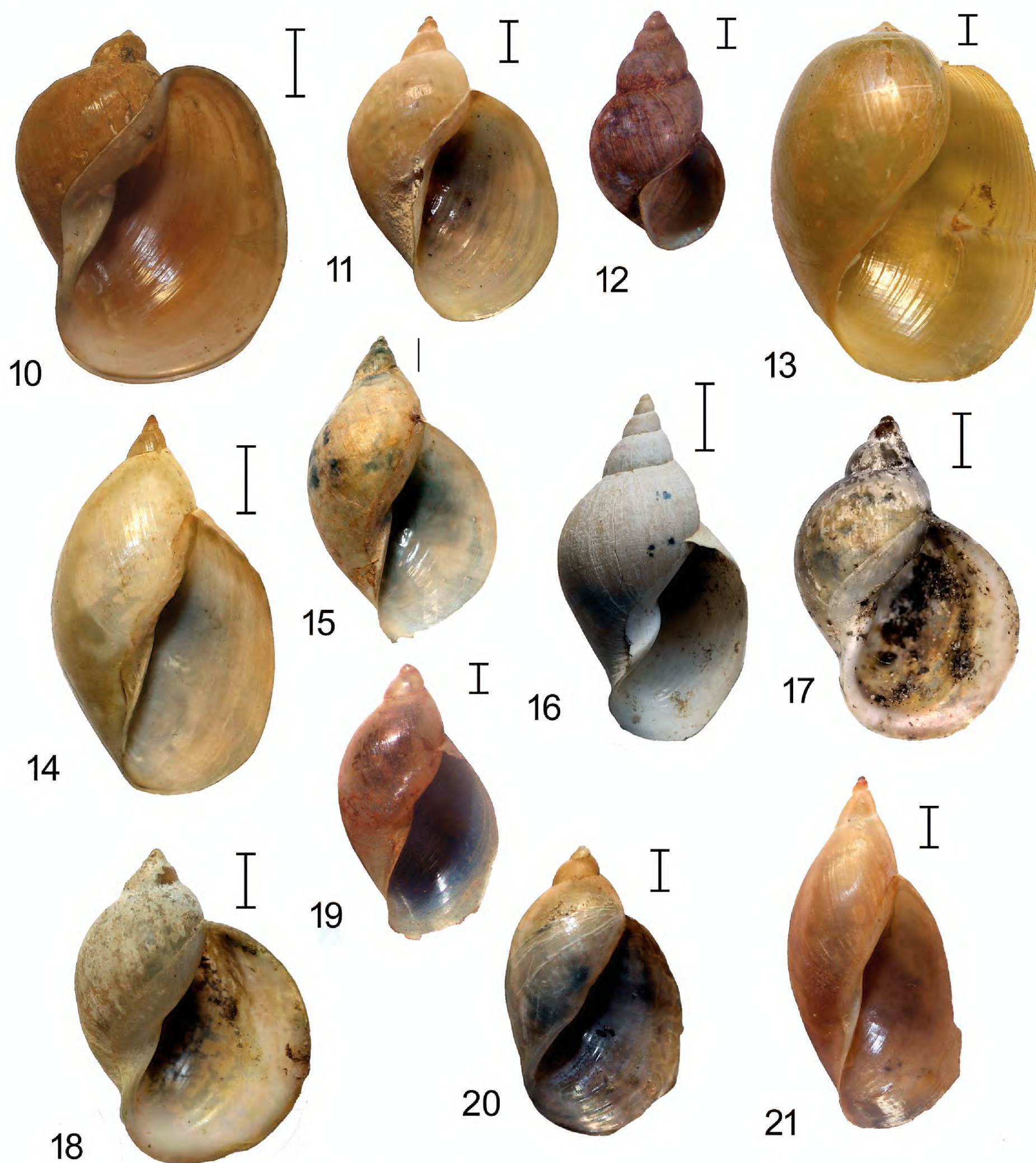
Fossaria cubensis Pointier et al. 2005: 38, textfigs

Type material. Two syntypes kept under No. 101522. leg. Pfeiffer.

Type locality. “Cuba”, without precise location.

Syntypes dimensions. (1) WN 5.25; SH 8.1; SW 4.4; SpH 4.5; BWH 5.9; AH 3.8; SW 3.1; (2) WN 5.25; SH 7.6; SW 4.1; SpH 4.1; BWH 5.2; AH 3.6; SW 2.7.

Current taxonomic allocation. *Galba (Bakerilymnaea) cubensis*. Some authors place this species into the genus *Fossaria* Westerlund, 1885.



Figures 10–21. Type specimens of Lymnaeidae (ZMB, ZIN), continuation. **10** – *Limnaea auricularia* var. *coreana* von Martens, 1886, a syntype. **11** – *Limnaea lagotis* var. *costulata*. **12** – *Limnaea cubensis* Pfeiffer, 1839, a syntype. **13** – *Amphipeplea cumingi-ana* Pfeiffer, 1845, a probable syntype (ZMB No. 109771). **14** – *Limnaea amygdalum* var. *cycacea* Troschel, 1837, a syntype. **15** – *Limnaea elmeteitensis* Smith, 1894, a syntype. **16** – *Stagnicola elrodi* Baker & Henderson, 1933, a syntype. **17** – *Limnaea ovata* var. *eversa* von Martens, 1882, the lectotype. **18** – *Limnaea ovata* var. *eversa* von Martens, 1882, a paralectotype. **19** – *Limnaeus natalensis* var. *exsertus* von Martens, 1966, the syntype. **20** – *Amphipeplea ampulla* var. *globosa* Suter, 1891, a syntype. **21** – *Limnaea acuminata* var. *gracilior* von Martens, 1881, the syntype. Scale bars: 1 mm (12, 19), 2 mm (11, 13, 15–18, 20, 21), 5 mm (10, 14). All shells are from ZMB collection, except of 17 (ZIN).

cumingiana (cumingi) Pfeiffer, 1845

Fig. 13

Amphipeplea cumingiana Pfeiffer 1845: 68.*Amphipeplea cumingi* Pfeiffer 1854–1860: 5, pl. II, figs 3–4.*Lymnaea cumingiana* Hubendick 1951: 162, fig. 355.

Type material. Two probable syntypes from Luzon Island kept under No. 109771. leg. Dunker ex coll. Pfeiffer. Another probable syntype from the same island is under No. 109772. The largest of these specimens is 26.1 mm height. The labels bear no information about the nomenclatorial status of the shells, and their identification as probable syntypes may be questioned. The species name on the labels is spelled as “*Amphipeplea cumingi*” (see Remark below).

Type locality. Philippines, island of Luzon, Naga, province of South Camerines. leg. Cuming.

Current taxonomic allocation. *Bullastra cumingiana*.

Remark. Originally, Pfeiffer (1845) described this species as *Amphipeplea cumingiana* but later he re-named it *A. cumingi*.

cycacea Troschel, 1837

Fig. 14

Limnaea amygdalum var. *cycacea* Troschel 1837: 170.*Lymnaea auricularia* race *rufescens* Hubendick 1951: 157, fig. 344.

Type material. Five syntypes kept under No. 109768.

Type locality. India, the Ganges River.

Current taxonomic allocation. *Radix (Radix) rufescens* (Gray, 1822).

elmeteitis Smith, 1894

Fig. 15

Limnaea elmeteitis Smith 1894: 167, fig. 5.*Lymnaea elmeteitis* Hubendick 1951: 59, fig. 74.*Limnaea elmeteitis* Kiliass 1961: 163.*Lymnaea natalensis* Brown 1994: 166, fig. 76 a, b; 79a.

Type material. Three syntypes of *L. elmeteitis* kept under No. 47554. The largest of them is 21.2 mm height. The rest of the type series is, probably, in BMNH.

Type locality. Kenya, lakes Baringo and Elmeteita.

Current taxonomic allocation. *Radix (Radix) natalensis* (Krauss, 1848).

elrodi Baker & Henderson, 1933

Fig. 16

Stagnicola elrodi Baker and Henderson 1933: 30.

Type material. ZMB collection possesses two syntypes kept under No. 90525. Other syntypes are in the University of Illinois Museum of Natural History (No. Z33780) and the University of Colorado Museum (No. 19134) [fide Baker and Henderson 1933].

Type locality. USA, Montana, west shore Flathead Lake, 13 1/2 miles north of Poison.

The largest ZMB syntype dimensions. WN 5.25; SH 16.3; SW 8.6; SpH 7.6; BWH 13.2; AH 10.2; SW 5.8.

Current taxonomic allocation. Hubendick (1951) identified *S. elrodi* with *Lymnaea emarginata* (Say, 1821). It should be noted, however, the ZMB syntypes resemble closely a subadult shell of the Holarctic *L. stagnalis*.

eversa von Martens, 1882

Figs 17, 18

Limnaea ovata var. *eversa* von Martens 1882: 35, pl. 4, fig. 7.*Limnaea auricularia* var. *eversa* Zhadin 1933: 96, fig. 39.*Lymnaea eversa* Starobogatov & Streletzkaia 1967: 231, fig. 18.

Type material. The lectotype of *L. ovata* var. *eversa* (see Fig. 17) was designated by Starobogatov and Streletzkaia (1967). It is housed in ZIN (No. 2 in systematic catalogue). ZIN collection contains also 25 paralectotypes (No. 1 in systematic catalogue). Other 19 paralectotypes (adult and juvenile shells) are in ZMB (accession number 34822).

Type locality. Northern Mongolia, Eter River near Dzha-Dzassyk Monastery. leg. Potanin, 1877.

Current taxonomic allocation. *Radix (Peregriana) balthica* (L., 1758). Most of the syntypes correspond to the species *Lymnaea (Peregriana) intermedia* Lamarck, 1822 sensu Kruglov 2005 = *R. balthica* s. lato.

ZMB paralectotypes dimensions. See Table 1.

exsertus von Martens, 1866

Fig. 19

Limnaeus natalensis var. *exsertus* von Martens 1866: 101, pl. 3, figs 8, 9.*Limnaeus natalensis* var. *exsertus* Clessin 1886: 400.*Limnaea exserta* von Martens 1897b: 136, pl. 6, fig. 7.*Lymnaea natalensis* Hubendick 1951: 158, figs 345–347.*Lymnaea natalensis* Brown 1994: 166, fig. 76 a, b; 79a.

Type material. A single shell (the syntype) is kept under No. 8586. This shell has 9.4 mm height.

Type locality. Ethiopia (Abyssinia), Aiz Zaba spring near Zasaga.

Current taxonomic allocation. *Radix (Radix) natalensis* (Krauss, 1848).

***globosa* Suter, 1891**

Fig. 20

Amphipeplea ampulla var. *globosa* Suter 1891: 93, pl. 18, figs 12a–c.
Amphipeplea ampulla var. *globosa* Suter 1893: 231.
Amphipeplea ampulla var. *globosa* Suter 1913: 608.
Simlimnaea tomentosa Dell 1956: 76, figs 33–48.
Amphipeplea ampulla var. *globosa* Kilius 1967: 339.
Lymnaea tomentosa tomentosa Climo and Pullan 1972: 8, fig. 1, C–I.

Type material. There are three syntypes in ZMB kept under No. 47040. The largest of them is 11.6 height. Another syntype is housed in the Museum of New Zealand (Te Papa Tongarewa) under accession number M 125108. leg. Suter.

Type locality. New Zealand, Southern Island, Governors Bush, Hooker Valley.

Current taxonomic allocation. *Austropeplea tomentosa* (Pfeiffer, 1855) [fide Climo and Pullan 1972].

***gracilior* von Martens, 1881**

Fig. 21

Limnaea acuminata var. *gracilior* von Martens 1881: 77.
Limnaea acuminata var. *gracilior* Preston 1915: 109.
Lymnaea auricularia race *rufescens* Hubendick 1951: 157, fig. 344.
Lymnaea (Pseudosuccinea) acuminata Subba Rao 1989: 126, figs 254–265, 272.

Type material. There is a single specimen (the syntype) of *L. acuminata* var. *gracilior* in ZMB (accession number 9362). Its shell height is equal to 22.5 mm (von Martens reported SH = 24.0 mm).

Type locality. India, Bengal (without precise location).

Current taxonomic allocation. *Radix (Radix) rufescens*.

***gutta* Villa & Villa, 1871**

Fig. 22

Limnaea gutta Villa and Villa 1871: 92 (nomen nudum).
Limnaea gutta Kilius, 1967: 339.

Type material. There is a single specimen (syntype) of *L. gutta* in ZMB (accession number 17739). Its shell height is equal to 6.6 mm.

Type locality. Italy, Lombardy (from the Villa and Villa's work title).

Current taxonomic allocation. The syntype of *L. gutta* may be identified as a juvenile *R. (Peregriana)* sp. Possibly, this shell belongs to *R. balthica* or *R. ampla* (Hartmann, 1821).

Remark. Villa and Villa (1871) published this species name without diagnosis or other information that would make it available under article 12 of the International Code of Zoological Nomenclature.

***humerosa* von Martens, 1897**

Fig. 23

Limnaea humerosa von Martens 1897b: 135, pl. 6, fig. 1.
Lymnaea natalensis Hubendick 1951: 158, figs 345–347.
Limnaea humerosa Kilius 1961: 163.
Lymnaea natalensis Brown 1994: 166, figs 76 a, b; 79a.

Type material. The lectotype (ZMB No. 101518) and six paralectotypes (No. 101519) in ZMB collection. The lectotype was designated by Kilius (1961), its shell height is 23.4 mm.

Type locality. Uganda, Mengo, in an artificial pond leg. Stuhlmann (05.01.1891) – locality of the lectotype. von Martens (1897b) mentioned more locations of this species in Uganda and other regions of East Africa.

Current taxonomic allocation. *Radix (Radix) natalensis*.

***impedita* Baker, 1934**

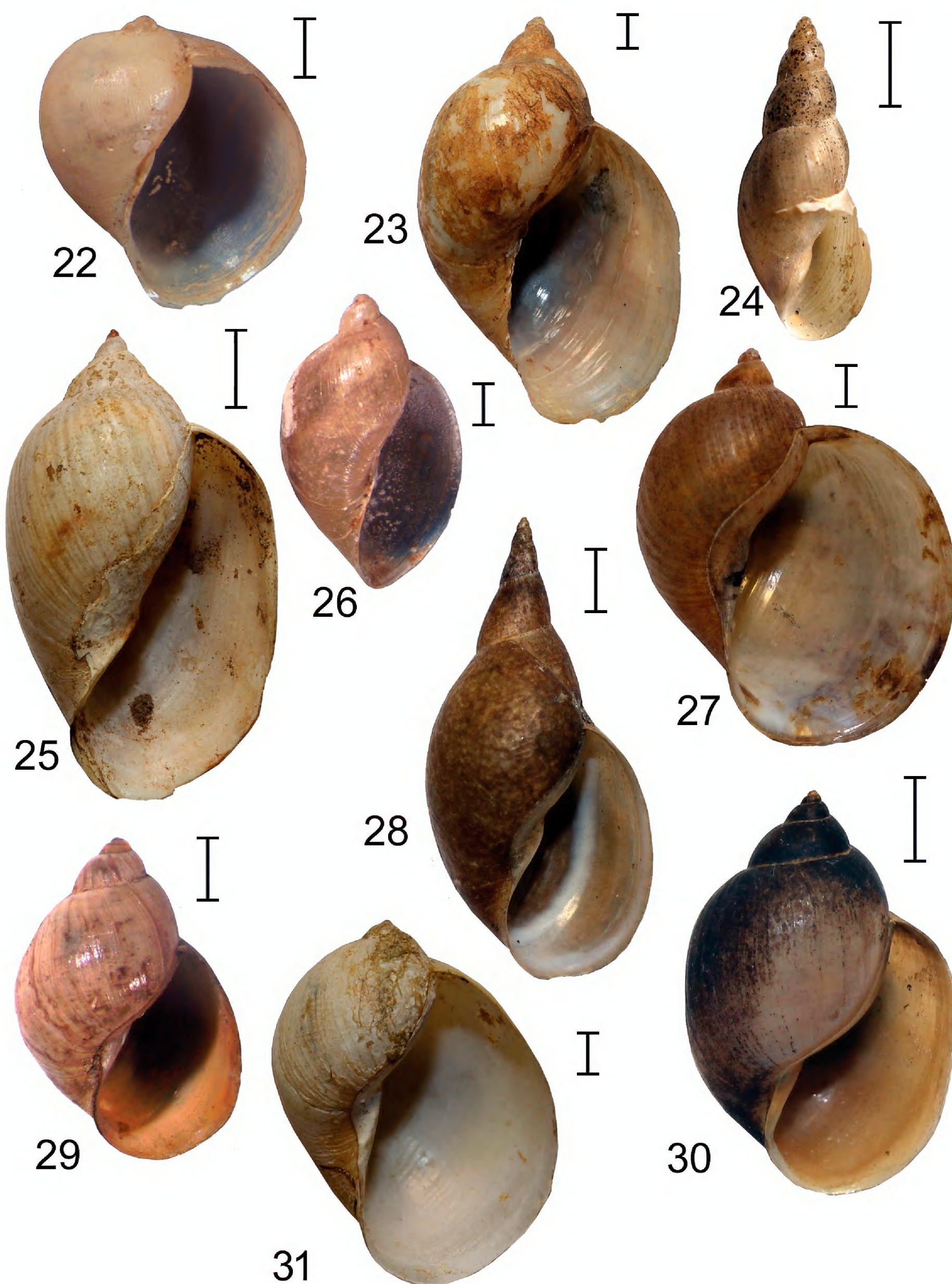
Fig. 24

Stagnicola impedita Baker 1934: 20.
Stagnicola impedita Kilius 1961: 163.

Type material. Originally, the type series consisted of four specimens (the holotype and three paratypes) housed in the Geological Department of the Stanford University under accession number 5776 (Baker 1934). Later, two of the paratypes were given to ZMB and are kept now under No. 90524. Their label contains an indication that the shells origin “from type lot”. The larger of two shells is 12.8 mm height that a little less than size reported by Baker (1934).

Type locality. USA, Utah, near Logan, Cash Co.

Current taxonomic allocation. Hubendick (1951) believe *S. impedita* to be a synonym of *Lymnaea palustris* (O.F. Müller, 1774), but it is incredible since this Palearctic species does not live in North America (Burch 1989; Johnson et al. 2013).



Figures 22–31. Type specimens of Lymnaeidae (ZMB), continuation. **22** – *Limnaea gutta* Villa & Villa, 1871, the syntype. **23** – *Limnaea humerosa* von Martens, 1897, the lectotype. **24** – *Stagnicola impedita* Baker, 1934, a paratype. **25** – *Limnaeus javanicus* var. *intumescens* von Martens, 1867, a syntype. **26** – *Limnaea kemp*i Preston, 1911, the syntype. **27** – *Limnaea limosa* var. *ovata* f. *margaritacea* Westerlund, 1865, a syntype. **28** – *Limnaea stagnalis* var. *westerlund*i f. *nereni* Westerlund, 1894, a syntype. **29** – *Limnaea nitidella* von Martens, 1885, the lectotype. **30** – *Limnaeus nucleus* Troschel, 1837, a syntype. **31** – *Limnaea nyansae* von Martens, 1892, a syntype. Scale bars: 1 mm (22, 26, 29), 2 mm (23, 24, 27, 31), 5 mm (25, 28, 30).

***intumescens* von Martens, 1867**

Fig. 25

Limnaeus javanicus var. *intumescens* von Martens 1867: 223.
Limnaea javanica var. *intumescens* von Martens 1881: 88, pl. 16, figs 2, 3.
Limnaea javanica var. *intumescens* von Martens 1897a: 3.
Limnaea javanica var. *intumescens* Kilius 1961: 163.

Type material. Three shells of syntypes collected in Surabaya (Java Island, Indonesia) and kept under No. 8140. The largest of these shells reaches 26.6 mm height. Kilius (1961) reported that he intended one of these shells to become the lectotype of *Limnaeus javanicus* var. *intumescens* and separated it under accession number 8140a, however I was not able to find this specimen in ZMB collection. Probably, it is still placed among other syntypes under No. 8140.

Type locality. Indonesia: Java Island (Surabaya, Passuruan, Rogodjampi). leg. von Martens and Zollinger.

Current taxonomic allocation. *Cerasina luteola*. Hubendick (1951) synonymized *L. javanica* var. *intumescens* with the race *rubiginosa* of *Radix auricularia*.

***kempi* Preston, 1912**

Fig. 26

Limnaea kempi Preston 1912: 190, pl. 32, fig. 1.
Limnaea natalensis Hubendick 1951: 158, figs 345–347.
Limnaea kempi Kilius 1961: 163.
Limnaea natalensis Brown 1994: 166, figs 76 a, b; 79a.

Type material. A single (subadult) specimen, the syntype, is kept in ZMB under accession number 62382. Its shell height is 7.4 mm.

Type locality. East Africa, Victoria Lake.

Current taxonomic allocation. *Radix (Radix) natalensis*.

***margaritacea* Westerlund, 1865**

Fig. 27

Limnaea limosa var. *ovata* f. *margaritacea* Westerlund 1865: 91.
Limnaea lagotis var. *margaritacea* Westerlund 1873: 334.
Limnaea lagotis var. *margaritacea* Westerlund 1885: 34.
Limnaea lagotis var. *margaritacea* Kilius 1961: 164.

Type material. Two syntypes are kept in ZMB under accession number 49531. The largest of them is 18.5 height. The other syntypes are in ZIN (No. 1 in systematic catalogue) and NMG (accession number 3690).

Type locality. Ronneby, Sweden.

Current taxonomic allocation. Most probably, *Radix (R.) auricularia*.

***nereni* Westerlund, 1894**

Fig. 28

Limnaea stagnalis var. *westerlundi* f. *nereni* Westerlund 1894: 196.
Limnaea stagnalis Hubendick 1951: 118, figs 299–300.
Limnaea stagnalis var. *westerlundi* f. *nereni* Kilius 1967: 339.
Limnaea stagnalis Glöer 2002: 222, fig. 250.

Type material. Two syntypes are kept in ZMB under accession number 49527. The largest of them is nearly 40 mm of height (the shell apex is broken). The four other syntypes are in ZIN (No. 1 in systematic catalogue). Possibly, some syntypes will be found in NMG.

Type locality. Skeninge, Sweden.

Current taxonomic allocation. *Limnaea (Limnaea) stagnalis*.

***nitidella* von Martens, 1885**

Fig. 29

Limnaea nitidella von Martens 1885: 178, pl. 35, figs 16, 17.
Limnaea nitidella Kilius 1961: 164.

Type material. The lectotype (designated by Kilius 1961) and 18 paralectotypes (ZMB No. 35593).

Type locality. Ecuador, region of Chorrera de Agoyan (von Martens 1885).

Lectotype dimensions. WN 3.75; SH 7.8; SW 5.1; SpH 2.9; BWH 6.5; AH 5.0; SW 3.3.

Current taxonomic allocation. Uncertain. Hubendick (1951) treated it as a species of unclear identity (possibly no lymnaeid). In my opinion, *L. nitidella* is similar to another lymnaeid species described from Ecuador, *L. cousini* (Jousseaume, 1887) [see conchological characterization of this species in Paraense 1995; Pointier et al. 2004] and may represent its senior objective synonym.

***nucleus* Troschel, 1837**

Fig. 30

Limnaeus nucleus Troschel 1837: 171.
Limnaea acuminata var. *nucleus* von Martens 1881: 82, pl. 15, figs 8, 9.
Limnaeus nucleus Clessin 1886: 378, pl. 50, fig. 6.
Limnaea acuminata var. *nucleus* Preston 1915: 109.
Limnaea luteola f. *ovalis* Annandale and Rao 1925: 184, fig. IV (2)

Type material. Ten syntypes are kept in ZMB under accession number 8051. The largest syntype's shell is 23.0 mm height.

Type locality. India, the Ganges River.

Current taxonomic allocation. A junior synonym of *Cerasina luteola*.

***nyansae* von Martens, 1892**

Fig. 31

Limnaea nyansae von Martens 1892: 16.
Lymnaea nyansae Hubendick 1951: 60, fig. 76.
Limnaea nyansae Kilius 1961: 164.
Lymnaea natalensis Brown 1994: 166, figs 76 a, b; 79a.

Type material. 16 shells (syntypes) from the type locality are kept in ZMB under accession number 101521. Kilius (1961) reported that he intended one of these shells to be the lectotype of *Limnaea nyansae* and separated it under No. 101521a, however I was not able to find this specimen in ZMB collection. Probably, it is still placed among other syntypes under No. 101521. The largest shell in this sample reaches 15.3 mm height.

Type locality. The western shore of the Victoria Lake, near Bukoba and Towalio.

Current taxonomic allocation. *Radix (Radix) natalensis*.

***obesus* von Martens, 1867**

Fig. 32

Limnaeus javanicus var. *obesus* von Martens 1867: 223.
Limnaea javanica var. *obesa* von Martens 1881: 87, pl. 16, fig. 1.
Limnaeus javanicus var. *obesus* Kilius, 1961: 164, fig. 5.

Type material. 14 shells of syntypes collected in Indonesia and kept under No. 8124. The largest of these shells reaches 27.0 mm height. Kilius (1961) reported that he intended one of these shells to be the lectotype of *Limnaeus javanicus* var. *obesus* and separated it under accession number 8124a, however I was not able to find this specimen in ZMB collection. Probably, it is still placed among other syntypes under No. 8124.

Type locality. Indonesia: Java Island (Telaga, Patengan). leg. Baron von Richthofen.

Current taxonomic allocation. *Cerasina luteola*. Hubendick (1951) synonymized *L. javanica* var. *obesus* with the race *rubiginosa* of *Radix auricularia*.

***obliquatus* von Martens, 1864**

Fig. 33

Limnaeus obliquatus von Martens 1864b: 116, pl. 3, figs 9–10.
Limnaea auricularia var. *obliquata* Zhadin 1933: 96, fig. 38.
Radix auricularia var. *obliquata* Zhadin 1952: 168, figs 65, 66.
Lymnaea (Radix) obliquata Kruglov and Starobogatov 1993: 88, fig. 13B.

Type material. Two syntypes (ZMB no. 7164). leg. Semenov.

Type locality. “Im Landsee Issyk-Kul am Nordabhang des Thienschan, 4691’ Pariser Fuss über der Meere, 43° N.B“ = Kyrgyzstan, northern shore of the Issyk-Kul’ Lake.

Current taxonomic allocation. *Radix (Radix) obliquata*.

Syntypes dimensions. (1) WN 3.75; SH 27.1; SW 25.2; SpH 7.3; BWH 26.3; AH 23.3; SW 16.8; (2) WN 4.12; SH 28.8; SW 25.8; SpH 6.8; BWH 27.4; AH 22.4; SW 17.6.

Remarks. The type series has been overlooked by Kilius (1961, 1967). Hubendick (1951) considered *L. obliquata* as a junior synonym of *R. auricularia*, whereas the Russian authors (Kruglov and Starobogatov 1993; Kantor et al. 2010) accept its validity.

***patulus* Troschel, 1837**

Fig. 34

Limnaeus patulus Troschel 1837: 167.
Limnaeus patulus Clessin 1886: 378, pl. 50, fig. 3.
Limnaea acuminata var. *patula* Preston 1915: 107.
Limnaea acuminata var. *patula* Annandale and Rao 1925: 181, fig. III (9).
Lymnaea auricularia race *rufescens* Hubendick 1951: 157, fig. 344.
Lymnaea acuminata f. *patula* Subba Rao 1989: 127, figs 256, 257.

Type material. The syntypes of *L. patulus* in ZMB are placed in two samples: No. 8044 (25 syntypes) and 72990 (a single syntype). leg. Lamare Piquot.

Type locality. India, the Ganges River.

Current taxonomic allocation. *Radix (Radix) rufescens*.

Syntypes dimensions. See Table 1.

***pervius* von Martens, 1867**

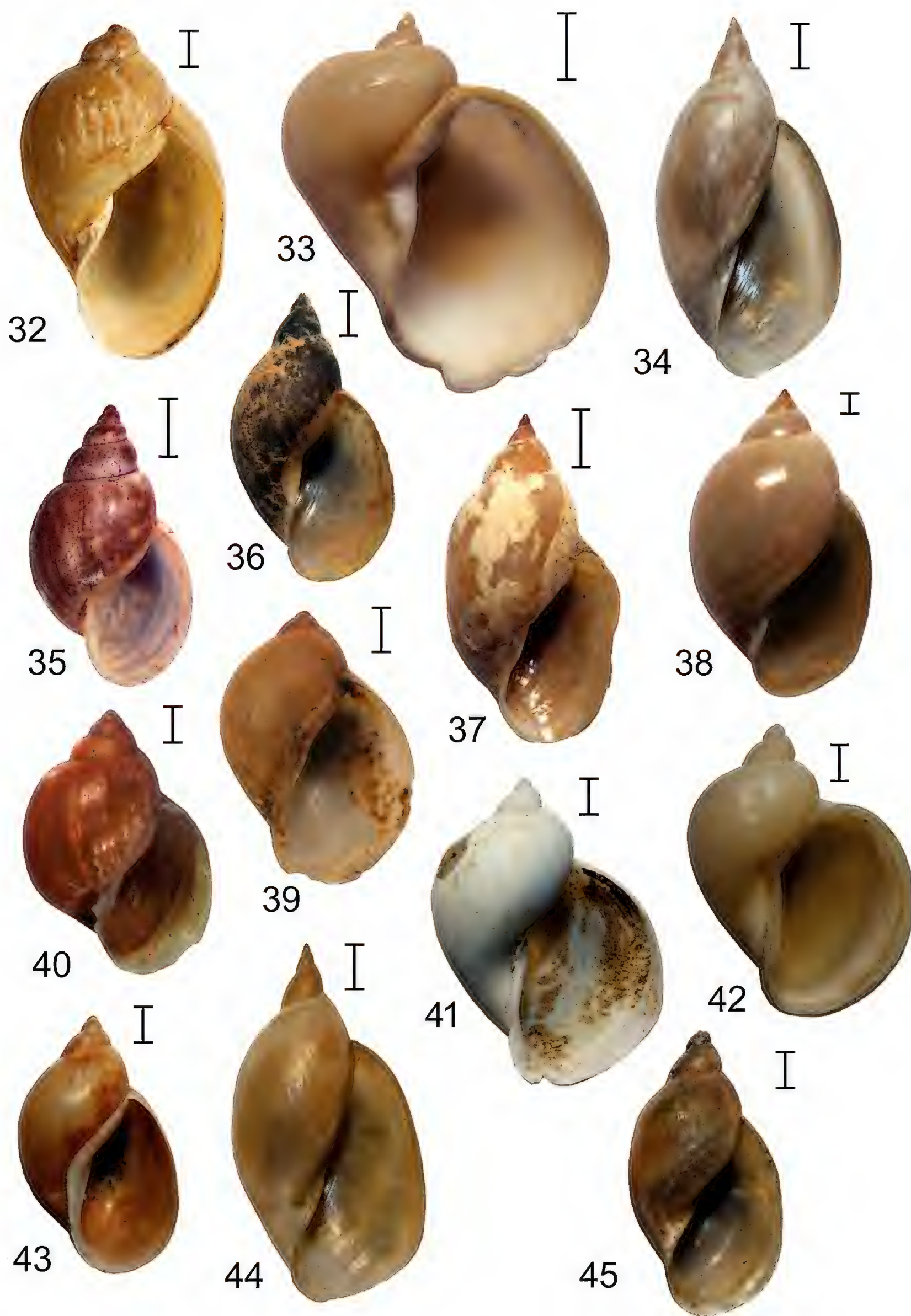
Fig. 35

Limnaeus pervius von Martens 1867: 221.
Limnaea pervia von Martens 1882: 40, pl. 4, fig. 11.
Limnaeus pervia Clessin 1886: 388, pl. 53, fig. 6.
Lymnaea pervia Hubendick 1951: 94, figs 234–235, 248–250.
Galba pervia Zhadin 1952: 176, fig. 77.
Limnaeus pervius Kilius 1961: 164.

Type material. The lectotype (designated by Kilius 1961) and 175 paratypes are kept in ZMB under accession numbers 8143a (the lectotype) and 8143b. The height of the lectotype shell is 11.4 mm.

Type locality. Northern China, Chi-foo (= Tschifu). leg. Schottmüller.

Current taxonomic allocation. *Orientogalba hookeri* (Reeve, 1850).



Figures 32–45. Type specimens of Lymnaeidae (ZMB), continuation. **32** – *Limnaeus javanicus* var. *obesus* von Martens, 1867, a syntype. **33** – *Limnaeus obliquatus* von Martens, 1864, a syntype. **34** – *Limnaeus patulus* Troschel, 1837, a syntype. **35** – *Limnaeus pervius* von Martens, 1867, the lectotype. **36** – *Limnaea pettiti* Jones & Preston, 1904, a syntype. **37** – *Limnaea javanica* var. *porrecta* von Martens, 1881, a syntype. **38** – *Limnaeus prunum* Troschel, 1837, a syntype. **39** – *Limnaea ovata* var. *sericina* Westerlund, 1890, a syntype. **40** – *Limnaea shantungensis* Jones & Preston, 1904, a syntype. **41** – *Limnaea ovata* var. *solidior* von Martens, 1882, a syntype. **42** – *Limnaea lagotis* var. *solidissima* Kobelt, 1872, a syntype. **43** – *Limnaea solidulus* Villa & Villa, 1871, a syntype. **44** – *Limnaea amygdalum* var. *straminea* Troschel, 1837, a syntype. **45** – *Limnaea javanica* var. *subteres* von Martens, 1881. Scale bars – 1 mm (40), 2 mm (32, 35, 36, 38, 39, 42–43, 45), 5 mm (33, 34, 37, 44).

Table 1. Measurements of shells of syntypes of some lymnaeid species described by von Martens (ZMB). Above lines – limits of variation, below the lines – means ± standard deviations.

Character / index	<i>Limnaea auricularia</i> var. <i>coreana</i>		<i>Limnaea eversa</i>	<i>Limnaeus patulus</i>
	No. 38440 (n = 7)	No. 55594 (n = 4)	No. 34822 (n = 10)	No. 8044 (n = 25)
Whorls number	<u>3.5 – 3.75</u> 3.62 ± 0.11	3.50 ± 0.00	<u>3.87 – 4.50</u> 4.08 ± 0.21	<u>5.00 – 5.50</u> 5.20 ± 0.13
SH, mm	<u>24.8 – 29.4</u> 27.9 ± 1.5	<u>27.5 – 31.8</u> 28.9 ± 2.0	<u>14.4 – 17.3</u> 15.7 ± 1.0	<u>34.6 – 44.4</u> 39.0 ± 2.9
SW, mm	<u>18.2 – 23.6</u> 21.3 ± 1.7	<u>22.1 – 26.5</u> 23.7 ± 2.0	<u>10.4 – 12.3</u> 11.2 ± 0.6	<u>16.2 – 24.6</u> 18.9 ± 2.3
SpH, mm	<u>3.4 – 5.4</u> 4.4 ± 0.7	<u>3.3 – 7.1</u> 4.7 ± 1.7	<u>4.3 – 5.9</u> 4.9 ± 0.5	<u>9.8 – 16.6</u> 13.0 ± 1.7
BWH, mm	<u>22.8 – 27.3</u> 25.6 ± 1.5	<u>22.1 – 29.9</u> 25.4 ± 3.5	<u>12.8 – 15.2</u> 13.7 ± 0.8	<u>29.4 – 39.3</u> 33.7 ± 2.8
AH, mm	<u>20.2 – 27.4</u> 24.5 ± 2.4	<u>24.8 – 26.7</u> 25.9 ± 0.8	<u>11.2 – 13.4</u> 12.2 ± 0.8	<u>24.8 – 33.8</u> 28.2 ± 2.6
AW, mm	14.6 – 19.8 17.8 ± 1.6	<u>18.2 – 19.2</u> 18.8 ± 0.4	<u>8.2 – 10.0</u> 8.9 ± 0.8	<u>11.8 – 19.1</u> 14.5 ± 2.2
SW/SH	<u>0.73 – 0.80</u> 0.76 ± 0.03	<u>0.79 – 0.85</u> 0.82 ± 0.03	<u>0.68 – 0.77</u> 0.72 ± 0.02	<u>0.42 – 0.55</u> 0.48 ± 0.03
SpH/SH	<u>0.14 – 0.20</u> 0.16 ± 0.02	<u>0.12 – 0.22</u> 0.16 ± 0.04	<u>0.27 – 0.35</u> 0.31 ± 0.02	<u>0.24 – 0.39</u> 0.48 ± 0.04
BWH/SH	<u>0.90 – 0.93</u> 0.92 ± 0.01	<u>0.79 – 0.94</u> 0.88 ± 0.07	<u>0.84 – 0.89</u> 0.87 ± 0.02	<u>0.82 – 0.89</u> 0.86 ± 0.02
AH/SH	<u>0.80 – 0.95</u> 0.89 ± 0.05	<u>0.84 – 0.93</u> 0.90 ± 0.04	<u>0.73 – 0.81</u> 0.78 ± 0.03	<u>0.66 – 0.80</u> 0.72 ± 0.03
AW/AH	<u>0.70 – 0.79</u> 0.73 ± 0.03	<u>0.70 – 0.76</u> 0.73 ± 0.02	<u>0.64 – 0.78</u> 0.74 ± 0.05	<u>0.49 – 0.64</u> 0.51 ± 0.04

***pettiti* Jones & Preston, 1904**

Fig. 36

Limnaea (*Gulnaria*) *pettiti* Jones and Preston 1904: 142, fig. 3.
Lymnaea pettiti Hubendick 1951: pl. IV, fig. 12.
Limnaea pettiti Kilius 1961: 164.

Type material. ZMB collection contains a single syntype (accession number 59228), its shell height is 13.4 mm. Hubendick (1951, pl. IV, fig. 12) illustrated the “type” (? syntype) of this species (BMNH collection).

Type locality. East China, “near Chefoo, Shantung” (= Shandong Province).

Current taxonomic allocation. Possibly, a synonym of *Radix* (*Radix*) *plicatula* (Benson, 1842).

***porrecta* von Martens, 1881**

Fig. 37

Limnaea javanica var. *porrecta* von Martens 1881: 89, figs 9, 10.
Limnaea javanica var. *porrecta* von Martens 1897a: 5.
Limnaea javanica var. *porrecta* Kilius 1961: 165.

Type material. There are 14 shells of this variety collected from the type locality in ZMB (No. 8135). The largest syntype is 28.7 mm height. Kilius (1961) reported

that he intended one of these shells to be the lectotype of *Limnaeus javanicus* var. *porrecta* and separated it under accession number 8135a, however I was not able to find this specimen in ZMB collection.

Type locality. Timor Island, Kupang. leg. E. von Martens, December 1862.

Current taxonomic allocation. *Cerasina luteola* (Lamarck, 1822).

***prunum* Troschel, 1837**

Fig. 38

Limnaeus prunum Troschel 1837: 170.
Limnaea acuminata var. *prunum* Preston 1915: 108.
Limnaeus prunum Kilius 1961: 165.

Type material. 12 syntypes of *L. prunum* in ZMB are kept in two samples: No. 101523 (11 syntypes) and 72998 (a single syntype), leg. Lamare Piquot. The shell height of the largest syntype is 27.4 mm.

Type locality. India, the Ganges River (Troschel 1837). The label of the syntypes is “Ganges, Bengalien”.

Current taxonomic allocation. *Cerasina luteola* (Lamarck, 1822).

***sericina* Westerlund, 1890**

Fig. 39

Limnaea (*Gulnaria*) *ovata* var. *sericina* Westerlund 1890: 147.
Limnaea ovata var. *sericina* Kilius 1967: 340.

Type material. Five syntypes are kept in ZMB under accession number 49529. The largest of them is 13.2 height. The other syntypes are in NMG (accession number 3726).

Type locality. Ronneby, Sweden.

Current taxonomic allocation. Most probably, *Radix* (*P.*) *balthica*.

Remark. The syntypes (ZMB No. 49529) are labelled as “*Limnaea ovata* var. *sericea*”, not *sericina* as in Westerlund (1890).

***shantungensis* Jones & Preston, 1904**

Fig. 40

Limnaea (*Gulnaria*) *shantungensis* Jones and Preston 1904: 142, fig. 4.
Lymnaea shantungensis Hubendick 1951: pl. IV, fig. 10.
Limnaea shantungensis Kilius 1961: 165.

Type material. ZMB collection contains a single syntype (accession number 59227), its shell height is 8.1 mm. Hubendick (1951, pl. IV, fig. 10) illustrated the “type” (? syntype) of this species (BMNH collection). Another syntype is kept in NHMV (accession number 40698).

Type locality. East China, “Shantung, Wei Hai Wei” (= Shandong Province).

Current taxonomic allocation. *Orientogalba viridis* (Quoy & Gaimard, 1834).

***solidior* von Martens, 1882**

Fig. 41

Limnaea ovata var. *solidior* von Martens 1882: 34, pl. 4, fig. 6.

Type material. ZMB collection contains seven syntypes (accession number 34817). The size of the syntypes is very different; the largest shell of this sample is 16.8 height.

Type locality. Northwestern China, Dzungaria, Ulungur River. leg. A. Regel, 1879.

Current taxonomic allocation. Possibly, *Radix* (*Peregriana*) *lagotis*.

***solidissima* Kobelt, 1872**

Fig. 42

Limnaea lagotis var. *solidissima* Kobelt 1872: 77, pl. 2, figs 7, 8.
Limnaea lagotis var. *solidissima* Kobelt 1877: 38, pl. 118, fig. 1242.
Limnaea lagotis var. *solidissima* Annandale and Rao 1925: 154, fig. I (3, 5).

Type material. ZMB collection contains a single syntype (accession number 20416).

Type locality. East India, Himalaya Mts. (without precise location).

Syntype dimensions. WN 4.00; SH 17.4; SW 13.2; SpH 6.6; BWH 15.3; AH 12.9; SW 8.8.

Current taxonomic allocation. *Radix* (*Peregriana*) *lagotis*.

***solidulus* Villa & Villa, 1871**

Fig. 43

Limnaea solidulus Villa and Villa 1871: 92 (nomen nudum).
Limnaea solidulus Kilius, 1967: 340.

Type material. There is a single specimen (syntype) of *L. solidulus* in ZMB (accession number 8192). Its shell height is equal to 14.1 mm.

Type locality. Italy, Brescia (from the syntype label).

Current taxonomic allocation. The syntype of *L. solidulus* may be identified as a juvenile *R. (Peregriana) balthica* = *Lymnaea intermedia* Lamarck, 1822 sensu Kruglov 2005.

Remark. Villa and Villa (1871) published this species name without diagnosis or other information that would make it available under article 12 of the International Code of Zoological Nomenclature.

***straminea* Troschel, 1837**

Fig. 44

Limnaea amygdalum var. *straminea* Troschel 1837: 169.
Lymnaea auricularia race *rufescens* Hubendick 1951: 157, fig. 344.

Type material. 31 syntypes kept in ZMB under No. 8047. The largest of them is of 35.4 mm height. There is another sample of this variety collected from the type locality in ZMB (without accession number). It contains two probable syntypes.

Type locality. India, the Ganges River.

Current taxonomic allocation. *Radix* (*Radix*) *rufescens* (Gray, 1822).

***subulatus* Dunker in Küster, 1862**

Fig. 46

Limnaeus subulatus Küster 1862: 24, pl. 4, fig. 24.
Limnaeus subulatus Clessin 1886: 395, pl. 16, figs 1, 2.

Type material. 11 shells from the type locality in three samples: no. 4613 and two without numbers. One of these shells (see fig. 45) is separated and marked as belonging to the type collection (a syntype). The rest of specimens are not formally labeled as syntypes but probably also origin from the type series.

Type locality. Mexico, in Zimapan and Lake of Mexico (Küster 1862). leg. Albers, Dunker.

Current taxonomic allocation. *Ladislavella* (*Walterlymnaea*) *elodes* (Say, 1821).

Syntype dimensions. WN 7.75; SH 32.2; SW 9.6; SpH 22.1; BWH 18.3; AH 11.8; SW 6.6.

Remarks. Not discussed by Kiliass (1961, 1967). Hubendick (1951) considered it to be a synonym of *Stagnicola palustris* that is apparently wrong since the latter species does not live in North America (Burch 1989; Johnson et al. 2013). Baker (1911) synonymized *L. subulatus* with *Stagnicola attenuata* (Say, 1829) that seems to be more reliable. Currently, *S. attenuata* is treated as identical with *Stagnicola elodes* (Say, 1821), placed by Vinarski (2012) into the subgenus *Walterlymnaea* Starobogatov & Budnikova, 1976 of the genus *Ladislavella* B. Dybowski, 1913.

***subteres* von Martens, 1881**

Fig. 45

Limnaea javanica var. *subteres* von Martens 1881: 88, figs 6, 7.
Limnaea javanica var. *subteres* von Martens 1897a: 4.
Limnaea javanica var. *subteres* Kiliass 1961: 165.

Type material. There is a single shell of this variety in ZMB (kept under No. 101520). Kiliass (1961) regarded it as the holotype (by monotypy). Its shell height is 17.1 mm.

Type locality. Indonesia, Sumatra Island, Palembang. leg. E. von Martens.

Current taxonomic allocation. Possibly, a synonym of *Radix* (*Radix*) *rubiginosa* (see Hubendick 1951).

***sulcatulus* Troschel, 1837**

Fig. 47

Limnaeus sulcatulus Troschel 1837: 167.
Limnaea acuminata var. *sulcatula* Preston 1915: 107.
Lymnaea auricularia race *rufescens* Hubendick 1951: 157, fig. 344.

Type material. Three samples in ZMB collection contain the syntypes of *L. sulcatulus*: No. 8046 (eight syntypes), No. 109764 (one syntype), and No. 109765 (one syntype). The largest's syntype shell height is 41.1 mm.

Type locality. India, the Ganges River.

Current taxonomic allocation. *Radix* (*Radix*) *rufescens*.

***tigrinus* Dohrn, 1858**

Fig. 48

Limnaea tigrina Dohrn 1858: 134.
Limnaea luteola f. *ovalis* Annandale and Rao 1925: 184, fig. IV (1).
Lymnaea luteola Hubendick 1951: 161, fig. 349.

Type material. A single shell (syntype) is housed in ZMB under accession number 13865. Its shell height is equal to 24.7 mm.

Type locality. Ceylon (without precise location).

Current taxonomic allocation. *Cerasina luteola* (Lamarck, 1822).

***undussumae* von Martens, 1897**

Fig. 49

Limnaea undussumae von Martens 1897: 135, pl. I, fig. 18; pl. VI, figs 2, 5.
Lymnaea undusumae (sic!) Hubendick 1951: 59, fig. 73.
Lymnaea natalensis Brown 1994: 166, figs 76 a, b; 79a.

Type material. The lectotype (designated by Kiliass 1967) and 22 paratypes are kept in ZMB under accession numbers 54301a and 54301 b. The lectotype's shell height is 19.8 mm.

Type locality. Undussuma, in a brook beyond the Tamaro. leg. Stuhlmann, 1891.

Current taxonomic allocation. *Radix* (*Radix*) *natalensis*.

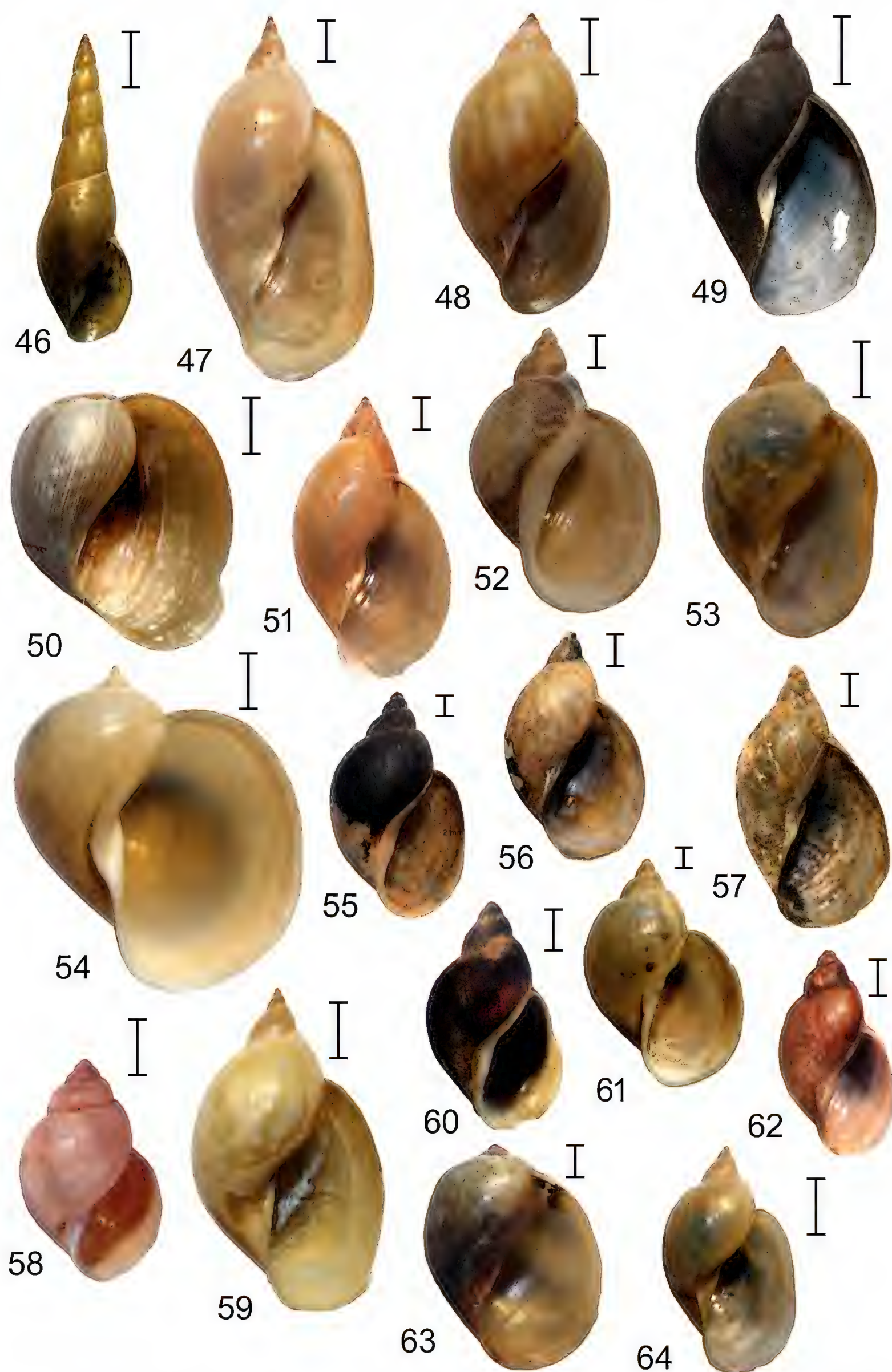
***velutinoides* Bergh, 1901**

Fig. 50

Bullastra velutinoides Bergh 1901: 254, pl. 20, figs 22–34.
Lymnaea cumingiana Hubendick 1951: 162, fig. 355.

Type material. The only shell (syntype) is kept in ZMB under accession number 22485. Its apex is corroded; shell height is 18.6 mm. Bergh (1901) reported there was two syntypes of this species in the Berlin Museum.

Type locality. Bergh (1901) stated it as “M[are] philippin.”, i.e. as the Philippine Sea. Possibly, the author sug-



Figures 46–64. Type specimens of Lymnaeidae (ZMB), continuation. 46 – *Limnaeus subulatus* Dunker in Küster, 1862, a syntype. 47 – *Limnaeus sulcatulus* Troschel, 1837, a syntype. 48 – *Limnaea tigrina* Dohrn, 1858, the syntype. 49 – *Limnaea undussumae* von Martens, 1897, the lectotype. 50 – *Bullastra velutinoides* Bergh, 1901, a syntype. 51 – *Limnaea whartoni* Jones & Preston, 1904, a syntype. 52 – *Limnaea lagotis* var. *yarkandensis* Nevill, 1878, a syntype. 53 – *Limnaeus coarctatus* Dunker. 54 – *Limnaeus compactus* “Ziegler”. 55 – *Limnaea cornea* “Ziegler”. 56 – *Limnaea elgonensis* Preston. 57 – *Limnaea fermanensis* Preston. 58 – *Limnaeus nebulosus* Dunker. 59 – *Limnaea acuminata* var. *nevilli* von Martens. 60 – *Limnaeus nigricans* “Ziegler”. 61 – *Limnaeus nitens* “Ziegler”. 62 – *Limnaeus opacus* “Ziegler”. 63 – *Amphipeplea pfefferiana* Dunker. 64 – *Limnaea splendens* Dunker. Scale bars: 2 mm (51, 52, 55–58, 60–63), 5 mm (46–50, 53, 54, 59, 64).

gested it may be a marine species. According to Kilius (1967), the syntype was collected in Manila by Salmin.

Current taxonomic allocation. *Bullastra cumingiana*.

whartoni Jones & Preston, 1904

Fig. 51

Limnaea (*Gulnaria*) *whartoni* Jones and Preston 1904: 142, fig. 1.
Lymnaea whartoni Hubendick 1951: 72, fig. 152; pl. IV, fig. 14.
Limnaea whartoni Kilius 1961: 165.

Type material. ZMB collection contains a single syntype (accession number 59226), its shell height is 16.3 mm. Hubendick (1951, pl. IV, fig. 14) illustrated the “type” (? syntype) of this species (BMNH collection). A single shell collected from the type locality and labelled as “M. Preston No. 49” is kept in MNHN (without accession number).

Type locality. East China, “Liu Shi Tao, north-east promontory of Shantung”.

Current taxonomic allocation. Possibly, *Radix plicatula*.

yarkandensis Nevill, 1878

Fig. 52

Limnaea lagotis var. *yarkandensis* Nevill 1878: 8.

Type material. Nevill (1878) reported he was able to examine more than 70 shells (syntypes) of this variety collected in Northern India. Ten of these specimens are kept now in ZMB (No. 27487). The largest of these shells is 18.0 height. The rest of syntypes may be placed in the Zoological Survey of India (where other type materials of Nevill are kept; see Subba Rao 1989).

Type locality. From near Sásak Taka (Nevill 1878: 9).

Current taxonomic allocation. *Radix* (*Peregriana*) *lagotis*.

Supplement

ZMB collection includes several type series belonging to lymnaeid species not mentioned in the taxonomic literature, including the most comprehensive catalogues (Küster 1862; Clessin 1886; Hubendick 1951), and their original descriptions remain unknown to me. Possibly, most of these “types” belong to the so-called “manuscript names” never published formally by their authors as it was not rare in the 19th century. Kilius (1967) listed three such doubtful names but closer examination of ZMB collection revealed as many as 12 lymnaeid species and varieties of unclear status. These are characterized below.

coarctatus Dunker

Fig. 53

Limnaeus coarctatus Dunker (? in MS).

Material. ZMB collection contains two specimens collected in Sumatra (Indonesia) and marked as ‘types’. The largest of two shells is 17.6 mm height.

Current taxonomic allocation. *Cerasina luteola*.

Remark. The species has not been mentioned in the most inclusive handbooks on lymnaeid taxonomy (Küster 1862; Clessin 1886; Hubendick 1951) as well as in special works devoted to continental malacofauna of the Ost-Indian region (von Martens 1897a).

compactus “Ziegler”

Fig. 54

Limnaeus compactus “Ziegler” (? in MS).

Material. Two shells collected in the Danube River in Austria are housed in ZMB under accession number 109748. The largest of two shells is 24.8 mm height.

Current taxonomic allocation. An obvious synonym of *R. auricularia*.

Remark. The species has not been mentioned in the most inclusive handbooks on lymnaeid taxonomy (Küster 1862; Clessin 1886; Hubendick 1951) as well as in special works devoted to the Central and Eastern Europe continental malacofauna, where other species attributed to Ziegler were listed (Rossmässler 1835; Beck 1837; Kobelt 1877; Westerlund 1885; Clessin 1887-1890). I have to add that the very attribution of this species to Ziegler is conventional. As Welter-Schultes (2013) explains, Ziegler was not a scientist. He was a shell dealer in Vienna and “sent labelled shells with new names to researchers, who then described the new species and attributed the names to the dealers. At the end they had many hundreds of names. After 1905 the malacologists agreed that shell dealers should not be regarded as authors of names because they had in most cases not done any scientific work” (Welter-Schultes 2013: 96).

cornea “Ziegler”

Fig. 55

Limnaea cornea “Ziegler” (? in MS).

Material. Three shells collected in Carniolia (= Kraina, a historical region of Slovenia) and kept in ZMB under accession number 109754 (ex Dunker collection). The largest of the three shells is 13.1 mm height.

Current taxonomic allocation. *Radix peregra* = *R. labiata* sensu Falkner et al. 2002.

Remark. *L. cornea* is absent in most taxonomic works devoted to overview of the European continental malacofauna, including those dealing with the species names attributed to Ziegler (Rossmässler 1835; Beck 1837; Küster 1862; Kobelt 1877; Clessin 1887; Hubendick 1951). Dupuy (1851: 473) as well as Westerlund (1885) listed *Limnaea cornea* Zgl. among synonyms of *L. peregra*, but I could not find any evidence that this species was ever described formally.

elgonensis Preston

Fig. 56

Limnaea elgonensis Preston (? in MS).

Material. A single specimen kept under No. 62871. Its shell height is 12.0 mm.

Type locality. Uganda, Mt. Elgon. leg. Preston.

Current taxonomic allocation. Probably, a junior synonym of *Radix natalensis*.

Remark. I could not find the original description of this species in Preston's works devoted to new taxa of African land and freshwater mollusks (Preston 1910a, b, 1911, 1912, 1913). Preston introduced several tens of species names, including those with the species epithet "*elgonensis*" (for instance, *Ledoulxia elgonensis* Preston, 1914, family Urocyclidae Simroth, 1899), however among lymnaeid taxa described by him the species name *Limnaea* (or *Limnaea*) *elgonensis* is absent. Both Hubendick (1951) and Brown (1994), in their comprehensive works dealing with the African Lymnaeidae, do not mention such a species. I am not sure Preston ever described it formally.

fernanensis Preston

Fig. 57

Limnaea fermanensis Preston (? in MS).

Material. A single shell is kept under No. 63775. This shell has 19.2 mm height.

Type locality. «British East Africa» (probably Kenya), Fort Fernan.

Current taxonomic allocation. *Radix* (*Radix*) *natalensis*.

Remark. See remark for *L. elgonensis* above.

nebulosus Dunker

Fig. 58

Limnaeus nebulosus Dunker (? in MS).

Material. Two shells (labelled as 'types') collected in the Antilles (without precise locality) and kept in ZMB under accession number 9364. The largest of them is of 8.5 mm height.

Current taxonomic allocation. Most probably, a synonym of *Galba cubensis*.

Remark. This species name is absent in subsequent comprehensive works devoted to overview the New World lymnaeid fauna (Küster 1862; Clessin 1886; von Martens 1890–1901; Hubendick 1951), and it remains unclear if *L. nebulosus* has been ever formally described.

nevilli von Martens

Fig. 59

Limnaea acuminata var. *nevilli* von Martens (? in MS).

Material. A single shell (SH = 32.3 mm) collected in Bengal (without precise location) by Lamare Piquot is kept in ZMB collection. Its label bears no accession number.

Current taxonomic allocation. *Radix* (*Radix*) *rufescens*.

Remark. I could not find this variety name in von Martens publications devoted to Indian freshwater snails (von Martens 1881, 1885) as well as in subsequent works on the subject (Preston 1915; Annandale and Rao 1925; Hubendick 1951; Subba Rao 1989).

nigricans "Ziegler"

Fig. 60

Limnaeus nigricans "Ziegler" (? in MS).

Material. A single shell, 10.8 mm shell height, collected in Neuwaldegg, Austria, is kept in ZMB under accession number 109749.

Current taxonomic allocation. An obvious synonym of *Radix* (*Peregriana*) *peregra* (O.F. Müller, 1774) auct. = *Radix labiata* (Rossmässler, 1835) sensu Falkner et al., 2002.

Remark. See comment to *Limnaeus compactus* "Ziegler" above.

***nitens* “Ziegler”**

Fig. 61

Limnaeus nitens “Ziegler” (? in MS).

Material. Two shells collected in Vienna, Austria, are kept in ZMB under accession number 109747. The largest of them has 12.8 mm shell height.

Current taxonomic allocation. Possibly, a synonym of *Radix (Peregriana) balthica*.

Remark. See comment to *Limnaeus compactus* “Ziegler” above.

***opacus* “Ziegler”**

Fig. 62

Limnaea opaca Dupuy 1851: 473.*Limnaeus pereger* var. *opacus* von Gallenstein 1852: 43.*Limnaea peregra* var. *opaca* Moquin-Tandon 1855: 468.

Material. Two shells collected in Carniolia and kept in ZMB under accession number 109755. The largest of two shells is 10.0 mm height.

Current taxonomic allocation. Possibly a synonym of *Radix (Peregriana) peregra* auct. = *Radix labiata* sensu Falkner et al. 2002.

Remark. Though a few authors of the 19th century used this taxon name (Dupuy 1851; von Gallenstein 1852; Moquin-Tandon 1855), I could not trace the source where it was described originally. Perhaps, it should be considered as one of those numerous “manuscript names” attributed to the authorship of Ziegler (see also comment to *Limnaeus compactus* above).

***pfeifferiana* Dunker**

Fig. 63

Amphipeplea pfeifferiana Dunker (? in MS).

Material. Five shells collected somewhere in New Holland (= mainland Australia) are kept in ZMB under accession number 109770. The largest of them is 14.1 mm height.

Current taxonomic allocation. Possibly, a synonym of *Austropeplea lessoni* (Deshayes, 1830).

Remark. Like other species names attributed to Dunker and listed in this supplement, *L. pfeifferiana* seems to be a member of the group of so-called “manuscript names”, whose original descriptions have been not found in the literature.

***splendens* Dunker**

Fig. 64

Limnaeus splendens Dunker (? in MS).

Material. Six shells from China (without precise location) kept under accession number 109769. The largest of them is 19.2 mm height.

Current taxonomic allocation. Possibly, a synonym of *Radix plicatula*.

Remark. See remark to *Amphipeplea pfeifferiana* above.

Acknowledgements

I wish to express my sincerest thanks to Dr. Matthias Glaubrecht (Hamburg, Centrum für Naturkunde) and Christine Zorn (Berlin, ZMB) for their indispensable help in organization of my work with ZMB malacological collection. Also I thank Anton Loginov (Komische Oper Berlin) and his family for their hospitality during my stay in Berlin. This study was supported by grants from the Russian Ministry of Education and Science (project no. 6.1957.2014/K) and the Russian Foundation for Basic Research (no. 14-04-01236). The Museum für Naturkunde supported the open access publication of this paper.

References

- Annandale N, Rao HS (1925) Materials for a revision of the recent Indian Limnaeidae (Mollusca Pulmonata). Records of the Indian Museum 27: 137–189. <http://faunaofindia.nic.in/PDFVolumes/records/027/03/0137-0189.pdf>
- Baker FC (1911) The Lymnaeidae of North and Middle America. Special publication of the Chicago Academy of Sciences, volume 3, 539 pp. doi: 10.5962/bhl.title.10622
- Baker FC (1934) New Lymnaeidae from the United States and Canada. I. California, Oregon and other western states. The Nautilus 48: 17–20. <http://biodiversitylibrary.org/page/8520848>
- Baker FC, Henderson J (1933) A new *Stagnicola* from Montana. The Nautilus 47: 30–32. <http://biodiversitylibrary.org/page/8522599>
- Beck H (1837) Index molluscorum praesentis aevi musei principis augustissimi Christiani Frederici. Hafniae, 124 pp. doi: 10.5962/bhl.title.77331
- Bergh R (1901) Bullacea. In: Semper von DrC (Ed.) Reisen in Archipel der Philippinen. Kreidel, Wiesbaden, 7, 4, 209–256. <http://biodiversitylibrary.org/page/14454288>
- Bogatov VV, Zatravkin MN (1990) Gastropod molluscs of fresh and brackish waters of the Far East of the USSR – A guide. Far Eastern branch of the Soviet Academy of Sciences, Vladivostok, 169 pp.
- Breure ASH (2013) Annotated type catalogue of the Orthalicoida (Mollusca, Gastropoda) in the Museum für Naturkunde, Berlin. ZooKeys 279: 1–101. doi: 10.3897/zookeys.279.4701

- Brown DS (1994) Freshwater snails of Africa and their medical importance. Taylor & Francis, London, 607 pp.
- Burch JB (1989) North American freshwater snails. Malacological publications, Hamburg (Michigan), 366 pp.
- Clessin S (1886) Die Familie der Limnaeiden enthaltend die Genera *Planorbis*, *Limnaeus*, *Physa* und *Amphipeplea*. Systematisches Conchylien-Cabinet von Martini und Chemnitz. Bauer und Raspe, Nürnberg, 1, 17, 29–34, 35a–36a, 63–430. <http://biodiversitylibrary.org/page/32776441>
- Clessin S (1887–1890) Die Mollusken-Fauna Österreich-Ungarns und der Schweiz. Bauer & Raspe, Nürnberg, 858 pp. doi: 10.5962/bhl.title.60371
- Climo FM, Pullan NB (1972) A taxonomic review of the family Lymnaeidae (Mollusca: Gastropoda) in New Zealand. Journal of the Royal Society of New Zealand 2: 5–13. doi: 10.1080/030-36758.1972.10423300
- Dell RK (1956) The freshwater Mollusca of New Zealand. Parts II and III. Part II. – The species previously assigned to the genera *Limnaea* and *Myxas*. Transactions of the Royal Society of New Zealand 84: 71–90. http://rsnz.natlib.govt.nz/volume/rsnz_84/rsnz_84_01_000740.pdf
- Dohrn H (1858) Descriptions of new species of land- and freshwater shells collected in Ceylon, from the collection of H. Cuming, Esq. Proceedings of the Zoological Society of London 26: 134–135. <http://biodiversitylibrary.org/page/32271631>
- Dupuy D (1851) Histoire naturelle des mollusques terrestres et d'eau douce qui vivent en France. V. Masson, Paris, 5: 459–594. <http://biodiversitylibrary.org/page/32249746>
- Falkner G, Ripken TEJ, Falkner M (2002) Mollusques continentaux de France. Liste de référence annotée et bibliographie. Collection Patrimoines Naturels 52: 1–350.
- Gallenstein M von (1852) Kärntern's Land- und Süßwasser-Conchylien. Klagenfurt, 78 pp. doi: 10.5962/bhl.title.10673
- Glaubrecht M, Fehér Z, Köhler F (2007) Inventorizing an invader: annotated type catalogue of Corbiculidae Gray, 1847 (Bivalvia, Heterodonta, Veneroidea), including Old World limnic *Corbicula* in the Natural History Museum Berlin. Malacologia 49: 243–272. doi: 10.4002/0076-2997-49.2.243
- Glaubrecht M, Salcedo-Vargas MA (2000) Annotated type catalogue of the Cephalopoda (Mollusca) in the Museum für Naturkunde, Humboldt University of Berlin. Mitteilungen aus dem Museum für Naturkunde Berlin, Zoologische Reihe 76: 269–282. doi: 10.1002/mmnz.20000760209
- Glaubrecht M, Zorn C (2012) More slug(-ish) science: another annotated catalogue on types of tropical pulmonate slugs (Mollusca: Gastropoda) in the collection of the Natural History Museum Berlin. Zoo-systematics and Evolution 88: 33–51. doi: 10.1002/zoos.201200005
- Glöer P (2002) Die Süßwassergastropoden Nord- und Mitteleuropas: Bestimmungsschlüssel, Lebensweise, Verbreitung. Conchbooks, Hackenheim, 327 pp.
- Hubendick B (1951) Recent Lymnaeidae. Their variation, morphology, taxonomy, nomenclature and distribution. Kungliga Svenska Vetenskapsakademiens Handlingar. Fjärde Serien 3(1): 1–223.
- Johnson PD, Bogan AE, Brown KM, Burkhead NM, Cordeiro JR, Garner JT, Hartfield PD, Lepitzki DAW, Mackie GL, Pip E, Tarpley TA, Tiemann JS, Whelan NV, Strong EE (2013) Conservation status of freshwater gastropods of Canada and the United States. Fisheries 38: 247–282. doi: 10.1080/03632415.2013.785396
- Jones KH, Preston HB (1904) List of Mollusca collected during the commission of H.M.S. “Waterwitch” in the China seas, 1901–1903, with description of new species. Proceedings of the Malacological Society of London 6: 138–151. <http://biodiversitylibrary.org/page/15176094>
- Kantor YI, Vinarski MV, Shileyko AA, Sysoev AV (2010) Catalogue of the continental mollusks of Russia and adjacent territories. Version 2.3.1 (issued 02.03.2010). <http://www.ruthenica.com/category-8.html>
- Kilius R (1961) Die Typen und Typoide der Mollusken-Sammlung des Zoologischen Museums in Berlin. Mitteilungen aus dem Zoologischen Museum in Berlin 37: 159–167. doi: 10.1002/mmnz.19610370106
- Kilius R (1967) Die Typen und Typoide der Mollusken-Sammlung des Zoologischen Museums in Berlin. Nachtrag und alphabetisches Register zu I. Euthyneura (Pulmonata), Basommatophora. Mitteilungen aus dem Zoologischen Museum in Berlin 43: 337–343. doi: 10.1002/mmnz.19670430217
- Kobelt W (1872) Eine Limnäe aus dem Himalaya. Malakozoologische Blätter 19: 76–77. <http://biodiversitylibrary.org/page/15647992>
- Kobelt W (1877) Rossmässler's Iconographie der Land- und Süßwasser-Mollusken mit vorzüglicher Berücksichtigung der Europäischen noch nicht abgebildeten Arten. C.W. Kreidel's Verlag, Wiesbaden 5: 1–129. <http://biodiversitylibrary.org/page/16288283>
- Köhler F (2007) Annotated type catalogue of the Bulimulinae (Pulmonata, Orthalicoidae, Bulimulidae) in the Museum für Naturkunde Berlin. Mitteilungen aus dem Museum für Naturkunde Berlin, Zoologische Reihe 83: 125–159. doi: 10.1002/mmnz.200700004
- Köhler F, Glaubrecht M (2006) The types of Ampullariidae Gray, 1824 (Mollusca, Gastropoda) in the Malacological Collection of the Natural History Museum, Berlin: an annotated catalogue with lectotype designations. Mitteilungen aus dem Museum für Naturkunde Berlin, Zoologische Reihe 82: 201–218. doi: 10.1002/mmnz.200600006
- Kruglov ND (2005) Molluscs of the family Lymnaeidae (Gastropoda Pulmonata) in Europe and northern Asia. SGPU Publishing, Smolensk, 507 pp. [In Russian]
- Kruglov ND, Starobogatov YI (1993) Annotated and illustrated catalogue of species of the family Lymnaeidae (Gastropoda Pulmonata Lymnaeiformes) of Palaearctic and adjacent river drainage areas. Part I. Ruthenica 3: 65–92.
- Küster HC (1862) Die Gattungen *Limnaeus*, *Amphipeplea*, *Chilina*, *Isidora* und *Physopsis*. Systematisches Conchylien-Cabinet von Martini und Chemnitz. Bauer und Raspe, Nürnberg, 1, 17b, 1–48. <http://biodiversitylibrary.org/page/32776995>
- Lindström G (1868) Om Gotlands nutida mollusker. Th. Norby, Wisby, 48 pp.
- Martens E von (1864a) Drei centralasiatische Schnecken. Malakozoologische Blätter 11: 114–119. <http://biodiversitylibrary.org/page/16079909>
- Martens E von (1864b) Fossile Süßwasser-Conchylien aus Sibirien. Zeitschrift der Deutschen Geologischen Gesellschaft 16: 345–351. <http://biodiversitylibrary.org/page/43812140>
- Martens E von (1866) Einige afrikanische Binnenconchylien. Malakozoologische Blätter 13: 91–110. <http://biodiversitylibrary.org/page/15855655>
- Martens E von (1867) Ueber die ostasiatischen Limnaeaceen. Malakozoologische Blätter 14: 211–227. <http://biodiversitylibrary.org/page/15856012>

- Martens E von (1874) Slugs (Mollusca). A.P. Fedchenko's Travel to Turkestan. Vol. II. Zoogeographic studies. Saint-Petersbourg-Moscow, 1, 1–66. [In Russian]
- Martens E von (1881) Conchologische Mittheilungen als Fortsetzung der Novitates Conchologicae. Th. Fischer, Cassel, 1, 1–101. <http://biodiversitylibrary.org/page/15865773>
- Martens E von (1882) Ueber centralasiatische Mollusken. Mémoires de l'Académie Impériale des Sciences de Saint-Petersbourg, series 7(30) 11: 1–65. <http://biodiversitylibrary.org/page/46871759>
- Martens E von (1885) Conchologische Mittheilungen als Fortsetzung der Novitates Conchologicae. Th. Fischer, Cassel, 2, 103–213. <http://biodiversitylibrary.org/page/15865850>
- Martens E von (1886) Einige der von Dr. Gottsche in Japan und Korea gesammelten Land- und Süßwasser-Mollusken. Sitzungsberichte der Gesellschaft der naturforschenden Freude zu Berlin. Jahrband 1886: 74–80. <http://biodiversitylibrary.org/page/7794138>
- Martens E von (1890–1901) Land and freshwater Mollusca. Biologia Centrali-Americana, or Contributions to the knowledge of the fauna and flora of Mexico and Central America. RH Porter, London, 706 pp. <http://biodiversitylibrary.org/page/573268>
- Martens E von (1892) Ueber einige neue Arten von Land- und Süßwasser-Mollusken aus Uganda und dem Victoria-Nyansa. Sitzungsberichte der Gesellschaft der naturforschenden Freude zu Berlin. Jahrband 2: 15–19. <http://biodiversitylibrary.org/page/8790481>
- Martens E von (1897a) Süß- und brackwasser-mollusken des Indischen Archipels. Zoologische Ergebnisse einer Reisen in Niederländisch Ost-Indien. E.J. Brill, Leiden, 4, 1–331. <http://biodiversitylibrary.org/page/36298713>
- Martens E von (1897b) Beschalte Weichthiere Deutsch Ost-Afrikas. D. Reimer, Berlin, 308 pp. doi: 10.5962/bhl.title.12943
- Moquin-Tandon A (1855) Histoire naturelle des mollusques terrestres et fluviatiles de France contenant des études générales sur leur anatomie et leur physiologie et la description particulière des genres, les espèces et des variétés. J.-B. Baillière, Paris, 2, 646 pp. doi: 10.5962/bhl.title.13098
- Nevill G (1878) Mollusca from Eastern Turkestan and Lada'k. Scientific results of the second Yarkand mission. Office of the superintendent of Gouvernment printing, Calcutta, 1–21. <http://biodiversitylibrary.org/page/19502434>
- Paraense WL (1995) *Lymnaea cousini* Jousseaume, 1887, from Ecuador (Gastropoda: Lymnaeidae). Memorias do Instituto Oswaldo Cruz 90: 605–609. doi: 10.1590/S0074-02761995000500011
- Pfeiffer L (1839) Bericht über die Ergebnisse meiner Reise nach Cuba im Winter 1838-1839. Archiv für Naturgeschichte 5: 346–358. <http://biodiversitylibrary.org/page/24904257>
- Pfeiffer L (1845) Description of a new species of *Amphipeplea*. Transactions of the Zoological Society of London, 13, 68. <http://biodiversitylibrary.org/page/12862564>
- Pfeiffer L (1854-1860) Novitates conchologicae. Series prima. Mollusca extramarina. Beschreibung und Abbildung neuer oder kritischer Land- und Süßwasser-Mollusken. Th. Fischer, Cassel, 1, 138 pp. doi: 10.5962/bhl.title.10371
- Pointier JP, Noya O, Amarista M, Théron A (2004) *Lymnaea cousini* Jousseaume, 1887 (Gastropoda: Lymnaeidae): first record for Venezuela. Memorias do Instituto Oswaldo Cruz 99: 567–569. doi: 10.1590/S0074-02762004000600005
- Pointier JP, Yong M, Gutiérrez A (2005) Guide to the freshwater molluscs of Cuba. Hackenheim, Conchbooks, 120 pp.
- Preston HB (1910a) Further additions to the molluscan fauna of Central Africa. Annals and Magazine of Natural History (8th series) 6: 58–64. <http://biodiversitylibrary.org/page/18619299>
- Preston HB (1910b) Additions to the non-marine molluscan fauna of British and German East Africa and Lake Albert Edward. Annals and Magazine of Natural History (8th series) 6: 526–536. <http://biodiversitylibrary.org/page/15629297>
- Preston HB (1911) Descriptions of thirty-six new species of land and freshwater shells from British East Africa, chiefly from Mount Kenia and the neighbouring district. Annals and Magazine of Natural History (8th series) 7: 463–476. <http://biodiversitylibrary.org/page/22098424>
- Preston HB (1912) Diagnoses of new species of terrestrial and fluviatile shells from British and German East Africa, with the description of a new genus (*Eussoia*) from the Eusso Nyiro River, B.E. Africa. Proceedings of the Zoological Society of London 1: 183–193. <http://biodiversitylibrary.org/page/31854892>
- Preston HB (1913) New species and varieties of terrestrial and fluviatile shells from Equatorial Africa. Revue Zoologique Africaine 3: 47–62. <http://biodiversitylibrary.org/page/32991295>
- Preston HB (1915) Mollusca (Freshwater Gastropoda & Pelecypoda). The Fauna of British India, including Ceylon and Burma. Taylor & Francis, London, 244 pp. doi: 10.5962/bhl.title.13091
- Rossmässler EA (1835) Iconographie der Land- und Süßwasser-Mollusken mit vorzüglicher Berücksichtigung der Europäischen noch nicht abgebildeten Arten. Arnoldische Buchhandlung, Dresden und Leipzig, 1, 1–132. <http://biodiversitylibrary.org/page/24986222>
- Smith JA (1894) A list of the land and fresh-water Mollusca collected by Dr. J.W. Gregory in East Africa during his expedition to Mount Kenia, with description of a few new species. Proceedings of the Malacological Society of London 1: 163–168. <http://biodiversitylibrary.org/page/15167466>
- Starobogatov YI, Prozorova LA, Bogatov VV, Saenko EM (2004) Molluscs. In: Tsalolikhin SY (Ed.) Key to freshwater invertebrates of Russia and adjacent lands. Vol. 6. Molluscs, polychaetes, nemerteans. Nauka, Sankt-Petersburg, 9–492. [In Russian]
- Starobogatov YI, Streletzkaia EA (1967) Composition and zoogeographical characteristics of freshwater malacofauna of the East Siberia and northern part of the Far East. Mollusks and their role in biocoenoses and formation of faunas = Trudy Zoologicheskogo Instituta AN SSSR 42: 221–268. [In Russian]
- Subba Rao NV (1989) Freshwater Molluscs of India: Handbook. Zoological Survey of India, Calcutta, 289 pp.
- Suter H (1890) Descriptions of new species of New Zealand land and fresh-water shells. Transactions and Proceedings of the New Zealand Institute 22: 221–229. <http://biodiversitylibrary.org/page/3288734>
- Suter H (1891) Descriptions of new species of New Zealand land and fresh-water shells. Transactions and Proceedings of the New Zealand Institute 23: 84–93. <http://biodiversitylibrary.org/page/9777645>
- Suter H (1893) Liste synonymique et bibliographique des Mollusques terrestres et fluviatiles de la Nouvelle-Zélande. Journal de Conchyliologie 41: 220–293. <http://biodiversitylibrary.org/page/9777645>
- Suter H (1913) Manual of the New Zealand Mollusca (With an Atlas of quarto plates). J. Mackay, Wellington, 1120 pp. doi: 10.5962/bhl.title.1716
- Troschel FH (1837) Neue Süßwasser-Conchylien aus dem Ganges. Archiv für Naturgeschichte 3: 166–182. <http://biodiversitylibrary.org/page/13477892>

- Villa A, Villa GB (1871) Specie e varietà di Molluschi della Lombardia, Catalogo sinonimico. *Bullettino Malacologico Italiano* 4: 81–96. <http://biodiversitylibrary.org/page/39452753>
- Vinarski MV (2012) The lymnaeid genus *Catascopia* Meier-Brook et Barges, 2002 (Mollusca: Gastropoda: Lymnaeidae), its synonymy and species composition. *Invertebrate Zoology* 9: 91–104. http://kmkjournals.com/upload/PDF/IZ/IZ%20Vol%2009/invert9_2%20091_104%20Vinarski.pdf
- Vinarski MV (2013) One, two, or several? How many lymnaeid genera are there? *Ruthenica* 23: 41–58. <http://www.biotaxa.org/Ruthenica/article/download/1020/1669>
- Vinarski MV, Nekhaev IO, Glöer P, von Proschwitz T (2013) Type materials of freshwater gastropod species described by C.A. Westerlund and accepted in current malacological taxonomy: a taxonomic and nomenclatorial study. *Ruthenica* 23: 79–108. <http://www.biotaxa.org/Ruthenica/article/view/3366/4996>
- Welter-Schultes FW (2013) Guidelines for the capture and management of digital zoological names information. Version 1.1 released on March 2013. Global Biodiversity Information Facility, Copenhagen, 126 pp. http://www.gbif.org/system/files_force/gbif_resource/resource-80625/gbif_Management_Zoological_Names_en_v1.1.pdf?download=1
- Westerlund CA (1865) Sveriges land- och sötvatten-mollusker. C.W.K. Gleerups, Lund, 142 pp. doi: 10.5962/bhl.title.13137
- Westerlund CA (1873) Fauna molluscorum terrestrium et fluviatilium Sueciae, Norvegiae et Daniae. 2. Sötvatten Mollusker. O.W. Backmann, Stockholm, 297–651. <http://biodiversitylibrary.org/page/13189205>
- Westerlund CA (1885) Fauna der in der Paläarktischen Region (Europa, Kaukasien, Sibirien, Turan, Persien, Kurdistan, Armenien, Mesopotamien, Kleinasien, Syrien, Arabien, Egypten, Tripolis, Tunisien, Algerien und Marocco) lebenden Binnenconchylien. V. Fam. Succineidae, Auriculidae, Limnaeidae, Cyclostomidae und Hydrocenidae. H. Ohlsson, Lund, 135 pp. doi: 10.5962/bhl.title.10301
- Westerlund CA (1890) Fauna der in der Paläarktischen Region (Europa, Kaukasien, Sibirien, Turan, Persien, Kurdistan, Armenien, Mesopotamien, Kleinasien, Syrien, Arabien, Egypten, Tripolis, Tunisien, Algerien und Marocco) lebenden Binnenconchylien. I Supplement. E.G. Johansson, Karlshamn, 179 pp.
- Westerlund CA (1894) Specilegium malacologicum. *Nachrichtenblatt der Deutschen Malakozoologischen Gesellschaft* 26: 190–205. <http://biodiversitylibrary.org/page/15601404>
- Zhadin VI (1933) The freshwater molluscs of the USSR. *Lensnabtehzdat*, Leningrad, 232 pp. [In Russian]
- Zhadin VI (1952) Fresh- and brakishwater mollusks of the USSR. *Sovetskaya Nauka*, Moscow, 346 pp. [In Russian]